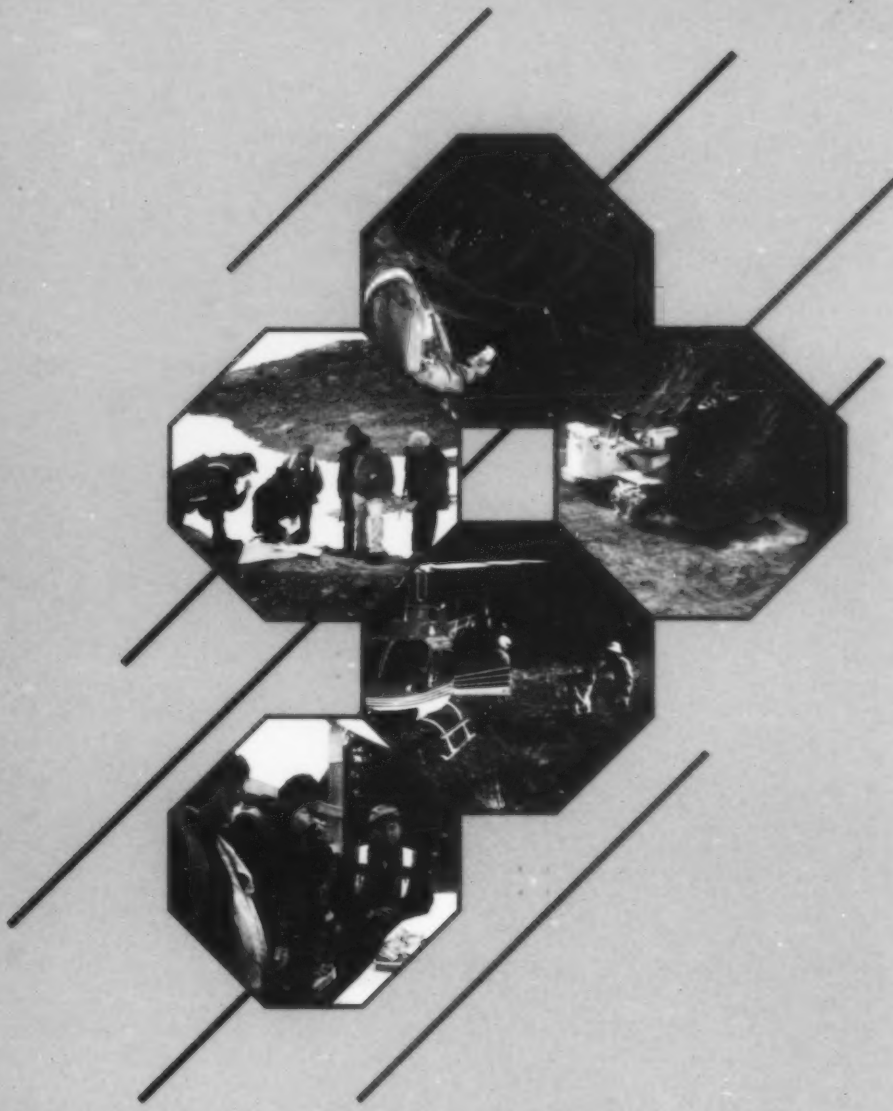
British Columbia Mineral Exploration Review 2003



BRITISH COLUMBIA

Information Circular 2004-1
Ministry of Energy and Mines

PHOTO CAPTIONS:

1. PHU VAN BUI (UBC) WORKING FOR LARRY DIAKOW (GSB) ON THE GSB REGIONAL MAPPING CREW IN THE TOODOGGONE, LOOKING SOUTHERLY OVER KEMESS NORTH DEPOSIT, NW BC.

2. JIM LOGAN (GSB), JOHN MIRKO, SANDY SEARS AND JIM OLIVER EXAMINING SULPHIDE EXPOSURES ON THE FOREMORE PROPERTY, NW BC.

3. KEMESS SOUTH OPEN PIT MINING OPERATION SUMMER 2003.

4. GSB REGIONAL MAPPING CREW, NORM GRAHAM (PILOT) WITH LEE FIERERRA (UVIC), STEVE JOHNSON (UVIC) AND MITCH MIHALYNUK (GSB; AT RIGHT EDGE OF PHOTO) LOADING CAMPING EQUIPMENT AT NAK (JOSSA'LUN DISCOVERY) NEAR ATLIN.

5. TOM RICHARDS (STEALTH), LARRY DIAKOW (GSB) AND STEVE ROWINS (UBC) EXAMINING DRILL CORE AT THE STEALTH MINERALS INC EXPLORATION CAMP IN THE TOODOGGONE.

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BRITISH COLUMBIA
2003 MINERAL EXPLORATION REVIEW

Ministry of Energy and Mines
Tom Schroeter, PEng/PGeo; Michael Cathro, PGeo; Jamie Pardy, PGeo; Robert Lane, PGeo;
Barry Ryan, PGeo; George Simandl, PGeo; David Terry, PGeo; and Paul Wojdak, PGeo

INTRODUCTION

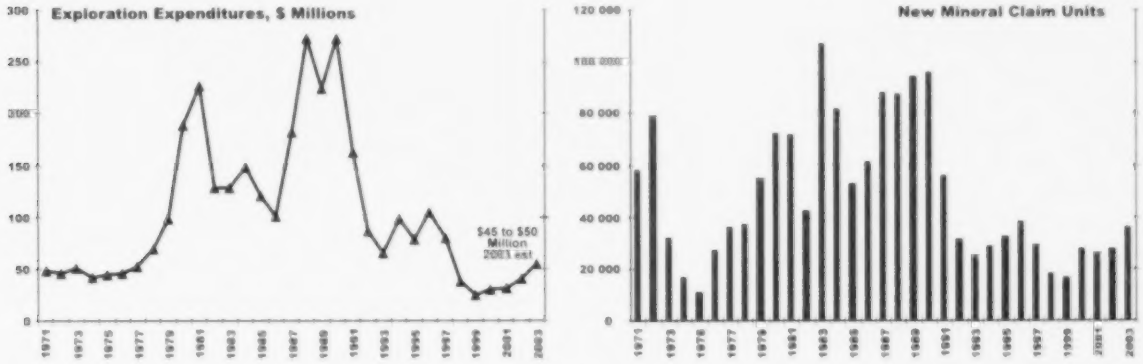
International mineral exploration and mining experienced an important recovery in investment and activity during 2003. There is every indication that this may signal a renewed demand for metals production. British Columbia, which had one of the most active years for exploration in a decade, is now in a recovery cycle, which may impact exploration and mining success in the province for years to come. Commodity prices have risen during the year, some substantially, led by gold breaking $400US per ounce by the year end. The mining industry has gained confidence, which has led to property acquisitions, new capital flowing into exploration and renewed interest in British Columbia projects. Mineral exploration expenditures increased for the fourth consecutive year and are estimated at $45 to $55 million for 2003. Exploration in 2004 is expected to further benefit from investment increases. Both the *Mining Exploration Tax Credit Program* and *Exploration Investment Tax Credit* for flow-through investors provide extra incentives to attract risk capital to the province.

Mineral exploration, particularly for gold deposits and bulk-tonnage gold-copper deposits, increased notably. Although coal production remained steady, there was a slight decline in coal-exploration expenditures but a continued strong interest in coalbed methane. Industrial minerals production expanded due to new processing capability even though exploration spending decreased. Sector trends were towards increased exports of aggregate and value-added processing of raw materials.

Mining continued to play a strong economic role with 13 metal and coal mines, approximately 32 industrial minerals quarries and mines, and more than 1100 aggregate pits in operation. The total value of solid mineral production for British Columbia is forecast at $2.96 billion, up 4% from 2002. Coal and many of the industrial mineral operations have substantial resources, however, most of BC's metal mines have less than 8 years of ore reserves.

On the development front, there are a number of more advanced projects included several gold-copper porphyry deposits. Many of these have seen renewed exploration after lying dormant for years. Significant results have been

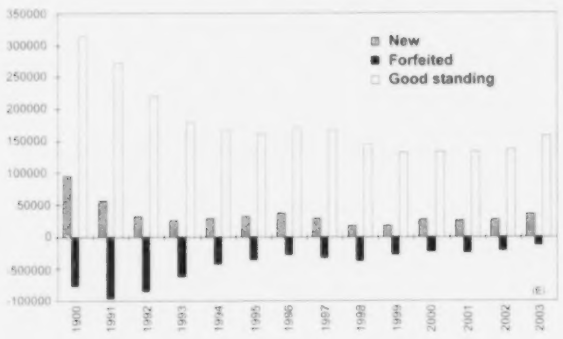
Figure 1...



Mineral exploration (fieldwork) expenditures, and new mineral claim units recorded in British Columbia

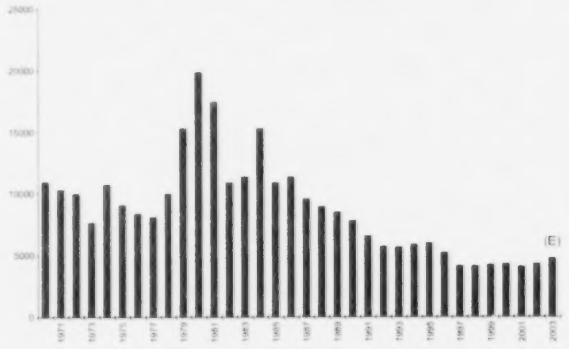
As in past years, information obtained in this review, including tonnages and grades, are from data released by the individual owners or operators. The Ministry of Energy and Mines makes every effort to accurately report this information, however, the Ministry is not responsible for errors or omissions. Monetary figures are in Canadian dollars. All information should be checked and verified before use.

Figure 2 ...



Mineral units (new, forfeited, good standing); 1990 - 2003

Figure 3 ...



Free Miner Certificates: 1970 to 2003

released from large exploration programs on: **Red Chris, Afton, Kemess North, Galore Creek, Gibraltar, Mount Polley** and **Morrison**. The **Mount Polley** and **Gibraltar** mines may reopen within the next two years.

Large exploration programs were carried out on the **Tulsequah Chief, Myra Falls** and **Eskay Creek** massive sulphide properties. The **Kutcho Creek** massive sulphide prospect has recently been reactivated. Several other programs targeted Eskay Creek-type mineralization in the northwest, and sedex mineralization in the southeast of the province.

Development work started preparations for an underground bulk sample from the Bonanza Ledge zone near the former **Cariboo Gold Quartz** mine, in the Wells-Barkerville camp. A positive feasibility study on the **Sustut** copper-silver project outlined a possible production scenario with processing at the Kemess South mine.

Tailings pond and mill construction took place at the **Bralorne** gold property. Definition drilling was completed on the **Elk (Siwash North)** gold property, and a gravity and flotation mill was purchased. Exploration drilling was undertaken on the **3Ts** epithermal gold-silver project and several new targets were outlined.

In the Greenwood camp, drilling and sampling were completed on the **Lexington** and **Golden Crown** mesothermal gold projects. In the Cassiar region, drilling was completed on the **Taurus (Cassi-Ore)** mesothermal gold deposit. Drilling on the Oban Breccia zone of the **Thorn** high-sulphidation, silver-gold-copper occurrence, northwest of Telegraph Creek, outlined an interesting bulk-tonnage target.

In the Harrison Lake area, exploration for nickel, copper, ±platinum group elements was carried out over the **Pacific Nickel Complex**, along a belt extending 75 kilometres north-northwest from the former Giant Mascot mine. A feasibility study on the **Cogburn** magmatic magnesium-metal project, near Harrison Lake, was commissioned and the owner is seeking a joint venture partner.

In the Toodoggone region, several previously known epithermal deposits were further explored (*e.g.* **Al, Lawyers, Shasta, Wrich Hill**); and, some potentially significant new discoveries were made (*e.g.* **Sickle Creek**).

A major drilling program on the **Lustdust** auriferous vein and skarn occurrence continued to yield interesting results. Drilling at the **QR** mine, an auriferous-skarn, focused on expanding the existing open-pit resources.

STATISTICS

During 2003 there were six metal, seven coal, thirty-two industrial mineral quarries and mines, and one tailings-recovery project operating within British Columbia. The province has a total landbase of 944 735 hectares, while total disturbed mining land is 27 000 hectares. Therefore, the percent of the BC landbase disturbed, but subject to reclamation, by mining is 0.028% or less than 0.03%.

Estimated expenditures on exploration fieldwork in British Columbia are $45 to $55 million during 2003, up over 25% from 2002. This is the fourth year in a row in which expenditures have risen. There were 87 exploration projects with budgets in excess of $100 000, up from 75 in 2002. The number of new mineral claim units recorded in 2003 is forecast at 36 000, an increase of 30% from the previous year (Figure 1). The number of total mineral units in good standing is forecast at approximately 154 000, up about 16% from 2002. The number of forfeited units is forecast at 13 100, down 38% from 2002 (Figure 2). This is the fourth year in a row that there have been increases in new mineral units recorded and a decrease in forfeited claims, another indication of sustained and growing interest in the province's mineral resources.

The number of Free Miner Certificates issued in 2003 (Figure 3) is forecast to be up slightly over those in 2002. The number of drilling programs, and the total metres

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drilled, in British Columbia rose significantly, with over 110 projects aggregating approximately 300 000 metres. This represents an increase of 18% and 28%, respectively. The largest increase in drilling was in the metals sector, which accounted for approximately 256 000 metres, a 37% increase over last year. Drilling for coal and industrial minerals is estimated at 32 200 and 10 800 metres, respectively. Coal drilling is down by approximately 27% from the previous year, while industrial minerals drilling is about the same as for 2002.

Although an estimated 12% of exploration spending was around mine sites, 76% of expenditures was on advanced projects and 12% on grassroots programs (Figure 4), and this indicates a resurgence of regional exploration.

MINING HIGHLIGHTS

The value of solid mineral production for the year is estimated at $2.96 billion, an increase of 4% over 2002 (Figures 5 and 6). The locations of the six metal, seven coal, thirty-two industrial mineral quarries and mines, and one tailings recovery project, which were in operation during 2003 are indicated in Figure 7 (*see also* Table 1). The mines employed a total, direct workforce of about 10 000. Final production figures for operating mines will be included in the forthcoming annual publication, *Exploration and Mining in British Columbia - 2003*.

Highlights of the metal mining operations included the continued, and important, gold and silver production at **Eskay Creek**, significant productivity improvements and modest financial gains at **Kemess South** in the Toodoggone district, and increased profits at most operations. The mines benefited in many cases from much better commodity prices, but these gains were partially offset by the rising value of the Canadian dollar. Table 1 provides estimated mine production and reserves/resources for 2003.

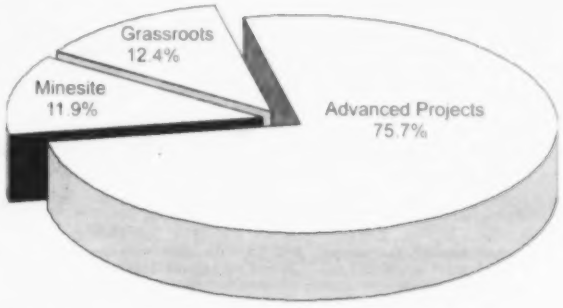
Copper represents 19.7% of total solid minerals production value, projected at $582.3 million, down about 3% from 2002. Production was down by approximately 1%, to 242.2 million kilograms.

Gold production is forecast to be 22.2 million grams (690 500 oz), up approximately 2% from 2002, and valued at about $360 million. Increases in production occurred at **Eskay Creek, Kemess South** and **Myra Falls**. Eskay Creek is the largest producer, with an estimated 11 100 kilograms (358 700 oz).

Silver output is estimated at 669 tonnes (21.5 million oz), up approximately 1% from 2002, and valued at $145.3 million. **Eskay Creek** is the largest producer, at an estimated 550.5 tonnes (17.7 million oz).

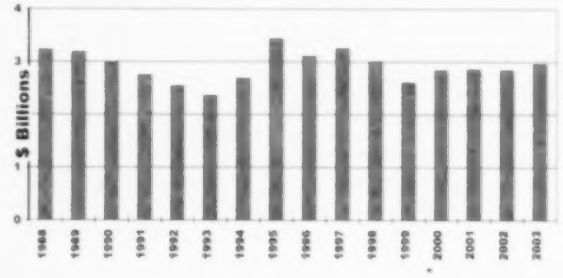
Zinc production is estimated to be 66.8 million kilograms worth $75.6 million, and lead output is estimated at 7.6 million kilograms valued at $5.2 million. These represent 49% and 234% increases in production for zinc and lead, respectively, due primarily to increased production at **Myra Falls**.

Figure 4 ...



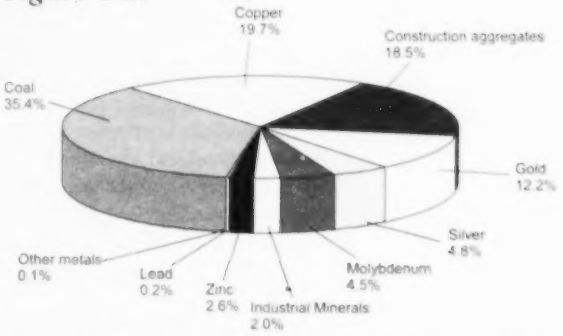
Exploration expenditures 2003; by level or category of program

Figure 5 ...



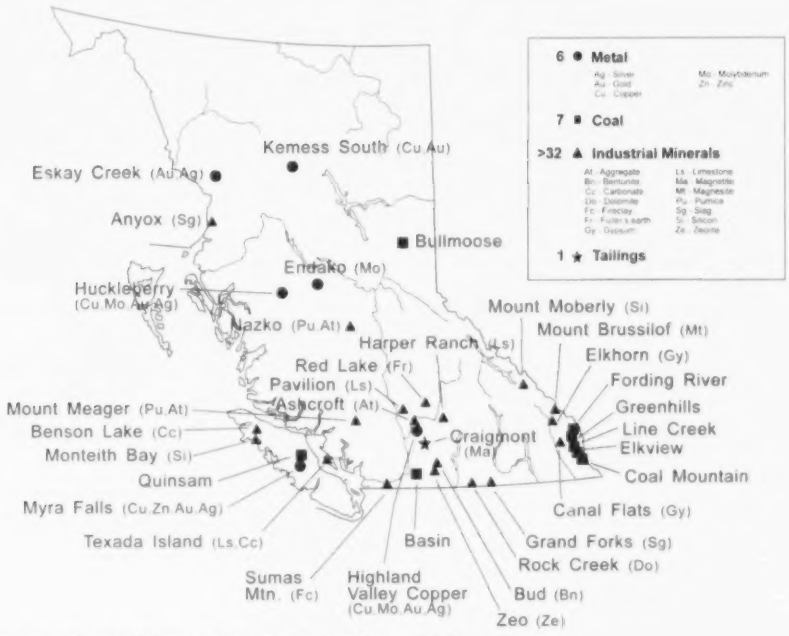
Solid mineral production value in British Columbia: 1988 to 2003

Figure 6 ...



Forecast value of solid mineral production in British Columbia; by percentage of total value - 2003

Figure 7 ...



Operating Mines in British Columbia - 2003

Molybdenum production is estimated at 8.7 million kilograms, valued at nearly $132.5 million. This 75% increase in value over 2002, driven by higher prices, reflects production from **Endako, Highland Valley Copper** and **Huckleberry**.

The forecast value of structural materials (including construction aggregates), at approximately $550 million, is up about 14% over last year; while that for industrial minerals is down about 27% to approximately $60 million. The new **Ashcroft** quarry and roofing-granule plant continued its operations during 2003. Two, relatively new, geyserite operations provided silica for cement plants. There are approximately 1100 construction aggregate operations in the province. Grassroots exploration for sources of gravel and crushed rock close to tidewater is active.

Clean coal production in 2003 is expected to total about 25.3 million tonnes, with a forecast value of approximately $1.05 billion, representing about 35.4% of the total solid mineral production (versus 37.7% in 2002). The reported value is at the mine gate and does not include rail or port costs, which the customer pays.

METALS

OPERATIONS

Production and reserve/resource estimates for 2003 are shown in Table 1.

The **Eskay Creek** massive sulphide, underground mine, owned and operated by Barrick Gold Corporation, is the fifth largest silver producer in the world and among the richest in terms of value per tonne of ore. In 2003, production was forecast at 11 157 kilograms (358 720 oz) of gold and 495 000 kilograms (15.3 million oz) of silver. The total operating cash cost during 2003 was forecast by the company to be US$64 per ounce of gold, net of silver co-product.

The mine production target for 2003 was 700 tonnes per day. Approximately 50% of the ore came from the 21B orebody and is all direct-shipping ore. About 25% came from the NEX zone and was mainly milling ore. The milling rate was 330 tonnes per day. Mining of direct shipping ore is scheduled to cease in 2005; after that, the cut-off grade for the milling ore will likely rise above the current 15 g/t Au. Optimum milling ore came from the 109 zone which is nearly mined out. The 44 orebody, deep in the plunging NEX zone at the northern end of the mine, was added to the reserve base and will supply high-grade milling ore. Mining was resumed in the 21C zone, which provides lower grade milling ore. Definition drilling continued in the Water Tower zone, a future source of milling ore in the footwall rhyolite. Present milling reserves are sufficient to 2008.

The 2003 surface and underground exploration program at Eskay Creek included 35 500 metres of diamond drilling. The main focus of the surface program was the 22 zone, 2 kilometres south of the Eskay Creek mine site. Drilling also increased known resources in the 21C, 21A and 21E zones. At the north end of the deposit, deeper holes were completed to test the area down-plunge from the NEX and Hangingwall zones.

At the **Kemess South** porphyry gold-copper mine, Northgate Exploration Limited achieved record production and mill availability during the third quarter of 2003,

TABLE 1 - Forecast Mine Production 2003

Mine	Operator	Deposit Type / Commodity	Forecast Production 2003	Proven and Probable Reserves (at Jan. 1, 2003)	Reference for Reserves
Metals					
Endako	Thompson Creek Mining Ltd / Nissho Iwai Moly Resources Inc	Calcalkalic porphyry Mo	4600 t Mo	Endako Pit - 38 200 000 t at 0.072% Mo. Denak Pit - 22 700 000 t at 0.069% Mo. surface stockpiles - 26 300 000 t at 0.04% Mo (Oct. 1, 2003)	Alan Mornsh, Mine Manager, written communication, VP & Genl Mgr, Dec. 5, 2003
Eskay Creek	Barrick Gold Corp	Transitional Epithermal-VMS	11 000 kg Au, 475 000 kg Ag	Shipping ore: 494 907 t at 51.81 g/t Au, 2604 g/t Ag. Milling Ore: 805 343 t at 23.38 g/t Au, 918 g/t Ag	Jim Rogers, Chief Geologist, written communication, Feb. 11, 2003
Highland Valley Copper	Teck Cominco Limited / BHP Billiton Ltd / Highmont Mining Co	Calcalkalic porphyry Cu-Mo	170 000 t Cu, 3200 t Mo, 500 kg Au, 70 000 kg Ag	Est. 295.8 Mt at 0.42% Cu	Production extrapolated from Teck Cominco Ltd 2003 3rd quarter report. Reserves from Teck Cominco Ltd. website
Huckleberry	Imperial Metals Corporation	Calcalkalic porphyry Cu-Mo	30 000 t Cu, 150 t Mo	36 719 000 t at 0.489% Cu, 0.013% Mo, 0.056 g/t Au	Clay Craig, Imperial Metals website, Nov., 2003
Kemess South	Kemess Mines Ltd (Northgate Exploration Ltd)	Calcalkalic porphyry Cu-Au	9020 kg Au, 34 000 t Cu	Proven: 109.4 million t at 0.712 g/t Au & 0.234% Cu. Indicated: 47.9 million t at 0.481 g/t Au & 0.168% Cu. Kemess North resource: 369 million t at 0.34 g/t Au & 0.18% Cu.	Kemess South, Northgate Exploration Ltd., 2002 Annual Report. Kemess North, Northgate Exploration Ltd. News Release, September 22, 2003
Myra Falls Operation	Boliden-Westmin (Canada) Limited	VMS Cu-Zn-Pb-Au-Ag	11 000 t Cu, 53 000 t Zn, 900 kg Au, 22 000 kg Ag	Mining reserve of 8.35 million t (proven and probable) at 1.2 g/t Au, 40.2 g/t Ag, 1.2% Cu, 0.55% Pb and 6.71% Zn	Production extrapolated from Boliden 2003 3rd quarter report. Reserves from Finley Bakker, Chief Mine Geologist, Myra Falls Oper. - pers. comm. Oct-03
Coal					
Basin (Tulameen)	Compliance Energy Corp	Thermal coal	20 000 t		
Bullmoose	Bullmoose Operating Corp (Teck Cominco Ltd)	Metallurgical Coal	479 000 t	Reserves exhausted & mine closed April 4, 2003	Teck Cominco Limited News Release, April 21, 2003
Coal Mountain	Elk Valley Coal Partnership	Metallugical coal	2.1 million t	32 million t	Annual Information Form - May, 2003
Elkview	Elk Valley Coal Partnership	Metallugical coal	5.6 million t	256 million t	Annual Information Form - May, 2003
Fording River	Elk Valley Coal Partnership	Metallugical coal	9.0 million t	254 million t	Annual Information Form - May, 2003
Greenhills	Elk Valley Coal Partnership	Metallugical coal	4.0 million t	107 million t	Annual Information Form - May, 2003
Line Creek	Elk Valley Coal Partnership	Metallugical coal	1.8 million t	37 million t (metallurgical) & 3 million t (thermal)	Annual Information Form - May, 2003
Quinsam	Hillsborough Resources Limited	Thermal coal	330 000 t	(2002) 30 million t proven and probable reserves	Stephen Gardner, Director of Exploration, Hillsborough Resources Ltd, personal communication, November, 2002

Industrial Minerals

Mine	Operator	Deposit Type / Commodity	Mine	Operator	Deposit Type / Commodity
4J	Georgia Pacific Canada Inc	Gypsum	Kettle Valley (Nipple etc)	Kettle Valley Stone Company	Aslar, flagstone, thin veneer
Ashcroft	IG Machine and Fiber Ltd (IKO Industries Ltd)	Basalt roofing granules	Lime Creek	IMASCO Minerals Inc	Limestone
Benson Lake	IMASCO Minerals Inc	Limestone	Moberly	Dynatec Inc	Silica sandstone
Blubber Bay	Ash Grove Cement Corporation	Limestone, Aggregate	Monteith Bay	Monteith Bay Resources Ltd (Lehigh Northwest Cement Ltd)	Hotspring silica
Bud	Western Industrial Clay Products Ltd	Bentonite	Mount Brussilof	Baymag Mines Company Ltd	Magnesite
Buse Lake	Lafarge Canada Inc	Volcanic ash (alumina-silica)	Mount Meager	Great Pacific Pumice Inc	Pumice, pozzolan
Craigmont	JV Craigmont Mines - M-Seven Industries	Magnetite tailings	Mount Meager	Garibaldi Aggregates Ltd	Pumice, pozzolan
Crawford Bay	IMASCO Minerals Inc	Dolomite	Nazko	Canada Pumice Corp	Lava rock
Elkhorn	Westroc Inc	Gypsum	Pavilion	Greymont Western Canada Inc	Limestone
Falkland	Lafarge Canada Inc	Gypsum	Red Lake	Western Industrial Clay Products Ltd	Diatomaceous earth, leonardite
Fireside	Fireside Minerals Inc	Barite	Rock Creek	Mighty White Dolomite Ltd	Dolomite
Fox Island	Quadra Stone	Granite	Sumas Mountain & Clayburn	Clayburn Industries Ltd / Lafarge Canada Inc. / Tilbury Cement Ltd	Shale, sandstone, clay, fireclay
Gillies Bay	Texada Quarrying Ltd	Limestone, aggregate	Van Anda	Imperial Limestone Co. Ltd.	Limestone
Giscome	Pacific Lime Products Ltd	Limestone	Winner	Roxul (West) Inc	Diorite
Hardy Island	Hardy Island Granite Quarries Ltd	Andesite	Z-1	Dynatec Inc	Zeolite
Harper Ranch	Lafarge Canada Inc	Limestone	Z-2	Industrial Minerals Processors	Zeolite

which resulted in a record quarterly net income. Recoveries of gold and copper also increased. The operating cash cost for the year was estimated by the company to be approximately US$175 per ounce of gold, net of copper credits. The mine employs about 385 workers. The daily milling rate averaged approximately 50 000 tonnes; third quarter results averaged a record 54 270 tonnes per day and 93% mill availability. Gold and copper production for 2003 are forecast to increase by 6% and 7%, respectively.

Seven kilometres north of the mine, Northgate completed an infill diamond-drilling program on its **Kemess North** porphyry gold-copper deposit and conducted exploration drilling on several other bulk-tonnage targets on the property, including the Nugget zone. According to the results of a pre-feasibility study released in September, 2003, the deposit is estimated to have a drill-indicated resource of 369 million tonnes grading 0.34 g/t Au and 0.18% Cu. The proposed development of Kemess North carries an estimated capital cost of US$126 million and would extend the Kemess mining operations to 2019. The pre-feasibility study predicts the operation would produce an average of 8800 kilograms (283 000 oz) of gold from 2004 through 2009 at a cash cost of US$173 per ounce. Average production over the 16-year mine life will be

7775 kilograms (250 000 oz) per year, at a cash cost of US$150 per ounce. During the period of simultaneous operation of the Kemess North and South pits commencing in late 2006, annual mill throughput will rise to 68 000 tonnes per day. When reserves are exhausted at Kemess South at the end of 2009, the mill throughput at Kemess North will be increased to 93 000 tonnes per day until 2019. The ore at Kemess North is exclusively hypogene and has similar milling and metallurgical characteristics to the hypogene ore at Kemess South. A final feasibility study is scheduled for completion in the first quarter of 2004. On-going fieldwork consists of geotechnical and condemnation drilling to confirm pit design parameters and to finalize the location of the access road and waste rock/tailings impoundment locations. Environmental monitoring studies, necessary for the preparation of an Environmental Impact Study, are in progress.

At the Nugget zone, 575 metres southwest of the proposed Kemess North open pit, drillhole KN-03-12 intersected 419.4 metres grading 0.38 g/t Au and 0.13% Cu, starting at a depth of 24.4 metres. The company believes there may be the opportunity to develop a small satellite pit with a very low stripping ratio as part of the Kemess North project. During 2003, several occurrences of skarn/carbonate-replacement type mineralization were identified on the Kemess property. These occurrences are in the Permian-aged Asitka Group rocks that stratigraphically underlie the Kemess deposits. Below Duncan Ridge, 5 kilometres west of Kemess North, drillhole DR-03-01 intersected 11.75 metres grading 0.8% Cu, 2.24% Zn and 12.7 g/t Ag. Deep penetrating, down-hole electromagnetic surveys are planned for this area in 2004. As part of Northgate's continuing assessment of the region surrounding the Kemess South mine, a number of new claims were staked over a 70 square kilometre area south of and adjacent to the existing Kemess claim block. The company will integrate the results of this year's airborne geophysical survey with a deep penetrating ground geophysical survey to identify conductive argillic alteration zones that may be associated with a hidden porphyry deposit. Prospecting on the Kemess property, and other claims in the region, identified several higher grade, precious and base metal showings (*e.g.* the Hilda mesothermal-vein and Archie sheeted-vein system).

The **Myra Falls** mine, owned and operated by Boliden-Westmin (Canada) Ltd, has been in operation since 1966. In excess of 23 million tonnes of massive sulphide, copper-zinc-gold-silver ore has been mined from several orebodies along a 6-kilometre northwest trend. Current ore reserves are situated in two main areas, Battle Gap and HW-43 block.

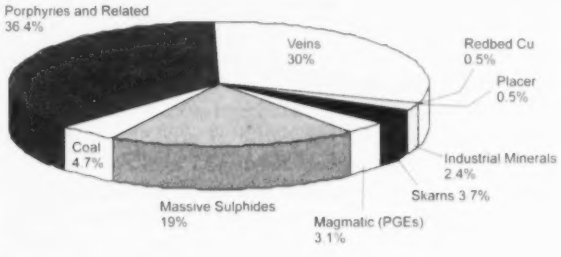
In 2003, Boliden re-established its exploration program at the mine, including the development of a 5-year exploration plan. A total of 35 targets have been identified and prioritized. The identification of additional ore will be tested by underground drilling (*e.g.* HW North lens, north of Gap, south of Gopher, east of Battle and north of Extension zones). A larger drilling program is planned and an exploration drift towards the Marshall zone at the western end of the property has been proposed for 2004. Boliden submitted a revised report requesting permission to connect to the BC Hydro power grid.

The **Highland Valley Copper** porphyry copper-molybdenum mine, a partnership among Teck Cominco Limited (63.9%), BHP Billiton (33.6%) and Highmont Mining Company (2.5%), is one of the largest open-pit operations in the world, ranking fifth on the basis of daily mill throughput in excess of 135 000 tonnes. The mine employs about 950 people and contributes about $450 million annually to the province. Mine life is currently estimated to be 5 to 6 years, however, the partnership is evaluating a pit expansion which could extend the mine life by 18 months. In December, 2003, BHP Billiton announced it had an agreement to sell its interest in the mine to Quadra Mining Ltd. The mine is expected to have a higher profit in 2003 as a result of higher sales and prices, offset partially by a weaker US dollar.

At the **Endako** porphyry molybdenum mine, Thompson Creek Metals Company (75%) and Nissho Iwai (25%) continued milling at a daily rate of approximately 28 000 tonnes. Production for 2003 is forecast to be similar to 2002. Endako has benefited from higher molybdenum prices in 2003. The company continued stripping to stabilize the pit wall.

Huckleberry Mines Ltd, owned by Imperial Metals Corporation (50%) and a consortium of Mitsubishi Material Corporation, Dowa Mining Ltd, Furakawa Company Ltd and Marubeni Corporation (50%), mills approximately 21 000 tonnes of ore daily at the **Huckleberry** porphyry copper-molybdenum mine, 123 kilometres southwest of Houston. The average milling grade during 2003 is forecast to be 0.54% Cu and 0.11%Mo. The East zone pit has been the source of ore since the Main zone was mined out in April, 2002. As a result of lower copper prices in 2002, the East zone mine design was revised. The probable reserves, as of December 31, 2002, were 36 719 000 tonnes grading 0.489% Cu, 0.013% Mo, 0.056 g/t Au and 2.884 g/t Ag, at a 0.26% Cu cutoff. The East zone

Figure 8 ...



Exploration Targets 2003: by Deposit Type (%)

Figure 9 ...

New Discoveries in British Columbia - 2003

ore is not as amenable to molybdenum recovery as the Main zone ore and, as a result, molybdenum recovery decreased when mining moved back to the East zone. Current mine life is projected to 2007. The copper concentrate is trucked to Stewart for shipment to Japan, while the molybdenum concentrate is trucked to and sold in Vancouver. In November, Imperial Metals announced a management restructuring at the mine that will give it more time to focus on its 100% owned Mount Polley property.

EXPLORATION PROJECTS

Auriferous porphyry and related deposits (36.4%) and auriferous vein deposits (30%) were the prime exploration targets in 2003 (Figure 8). Massive sulphides and coal exploration accounted for about 19% and 5% of expenditures, respectively (versus 19% and 13%, respectively in 2002). Highlights of the 2003 exploration season include a number of advanced projects, *e.g.* **Red Chris, Afton, Kemess North, Mount Polley, Gibraltar, Galore Creek, Lorraine, Tulsequah Chief, Eskay Creek, Myra Falls, Kutcho Creek, Cariboo Gold Quartz, Elk, Lustdust** and **QR** (*see* Figure 10). Some of the more notable, grassroots projects include **Kiniskan, 3Ts, Thorn, Pine (Sickle Creek), Foremore, Turnagain, Elizabeth, Sib, Crowsnest/Howell, Big Bulk, Woodjam, Nak, Lexington, Golden Crown, Spanish Mountain, Thea 17, Tommy Jack** and **Klatt**. Major exploration projects, with expenditures in excess of $100 000 and including physical work, are listed in Table 2.

In 2003, the number of new mineral discoveries more than doubled from the previous year, and about 24 were recorded from throughout the province (*see* Figure 9 and Table 3).

Projects in the Environmental Assessment Process include: **Cariboo Gold Quartz, Prosperity, Red Chris, Silvertip** and **Kemess North**. Certified metal projects with amendments include: **Mt. Milligan** (1998), **Cirque** (1999), **Sulphurets (Bruceside)** (2001) and **Tulsequah Chief** (2002).

Porphyry and Related Deposits

During 2003, Imperial Metals Corporation discovered the rich Northeast zone (also called Wishbone), at its past-producing **Mount Polley** alkalic porphyry copper-gold mine, 56 kilometres northeast of Williams Lake. Imperial completed 16 holes during its first phase of drilling and outlined a northwest-trending zone, with minimum dimensions of approximately 275 x 100 metres. Five holes out of a planned 60 were completed by the end of the year. The new zone, located only 1.5 kilometres northeast of the Bell pit, is hosted by potassium-feldspar rich, hydrothermal breccia (as are the other three deposits on the property; namely, Cariboo, Bell and Springer) where secondary biotite appears to be associated with higher grade copper and gold values. Chalcopyrite and bornite are the predominant sulphide minerals. All holes intersected significant intervals of copper-gold mineralization (*e.g.*, WB03-07, 200 metres grading 1.02% Cu, 0.4 g/t Au and 7.31 g/t Ag). The company also drilled four deep holes on the Springer zone, adjacent to the Cariboo open pit, which it had previously estimated to contain probable reserves of 15.3 million tonnes grading 0.4% Cu and 0.39 g/t Au. The first hole, drilled vertically, intersected 466.3 metres grading 0.49% Cu and 0.36 g/t Au. The bottom 267.5 metres is below the pit design and averaged 0.61% Cu and 0.49 g/t Au. Imperial will also drill four holes below

the partly mined Bell pit, which is estimated to have probable reserves of 3.4 million tonnes grading 0.36% Cu and 0.36 g/t Au.

In the summer of 2003, bcMetals Corporation gained majority ownership of the **Red Chris** alkalic porphyry copper-gold property (Teck Cominco Limited retains a 20% interest). In November, an amended option agreement between bcMetals, Red Chris Development Company Ltd (its wholly owned subsidiary) and Teck Cominco was announced, whereby bcMetals was granted an option to acquire all of Teck's ownership, rights and interest in the project. The property is located 15 kilometres east of Highway 37, 20 kilometres southeast of Iskut. As operator, bcMetals conducted a $3.6-million, 16 123 metre-diamond-drilling program. The primary purpose of the infill program (50-m centres) was to confirm resources calculated by a previous operator, based on 74 780 metres of drilling (288 holes during 1972 to 1995), in the East and Main zones. This will provide the data required to complete a detailed feasibility study. Other work included condemnation and geotechnical drilling, additional metallurgical test work and further environmental monitoring. At a 0.5% Cu cut-off grade, measured resources stood at 11.8 million tonnes grading 0.852% Cu and 0.766 g/t Au; indicated resources are 37.5 tonnes grading 0.686% Cu and 0.572 g/t Au; and, inferred resources are 29.2 million tonnes grading 0.614% Cu and 0.499 g/t Au. A new resource estimate is expected in January, 2004, and the feasibility study is due in the third quarter. In November, bcMetals submitted a project proposal to the Environmental Assessment Office.

In August, 2003, SpectrumGold Inc (an affiliate of NovaGold Resources Inc) signed an agreement with Rio Tinto plc and Anglo American plc to buy the **Galore Creek** alkalic porphyry gold-copper property, 75 kilometres south of Telegraph Creek. SpectrumGold's initial due diligence work led to a reinterpretation that Galore Creek is not a classic porphyry occurrence but rather a higher-grade alkalic intrusive-related deposit with the bulk of the mineralization associated with sulphide-rich replacement of favourable volcanic units. A 1992 resource, estimated by Kennecott Exploration Ltd for the Main zone, included measured and indicated resources at 243.2 million tonnes grading 0.45 g/t Au, 6 g/t Ag and 0.75% Cu. The inferred resource was estimated at 70.6 million tonnes grading 0.63 g/t Au, 6 g/t Ag and 0.59% Cu. In addition, the Southwest zone indicated resource was estimated at 42.4 million tonnes grading 1.03 g/t Au, 7 g/t Ag and 0.55% Cu, and the North Junction zone indicated resource was 7.7 million tonnes grading 1.5% Cu, based on a 0.4% Cu cutoff. These estimates were based on nearly 500 drillholes totaling over 100 000 metres of drilling.

During 2003, SpectrumGold developed a geological model based on the relogging of existing core, as well as results from a recently completed 2947-metre drilling program, which tested four broad areas of the Main zone (North Gold zone, South Gold zone, Central Replacement zone and Southwest Breccia zone). All eight holes were angled to test for potential structural controls to mineralization; both the gold and copper grades were higher than anticipated from previous vertical drilling. In the Main zone, higher gold grades are associated with strong, disseminated chalcopyrite mineralization. Broad areas of more copper-rich mineralization carry both chalcopyrite and bornite. The Southwest Breccia zone is a separate deposit, south of the Main zone. On the southern end of the South Gold zone, drilling resulted in the discovery of a new mineralized zone and bottomed in strongly mineralized material. Mineralization in this new horizon is similar in style to the Central Replacement zone and is open to the south. Four, 50-kilogram bulk samples were taken for detailed metallurgical studies. Hatch Engineering Ltd has been engaged to complete an economic assessment and resource estimation study. A major drilling campaign is anticipated for 2004, to test new targets and confirm the company's new geological interpretation.

In September, 2003, Eagle Plains Resources Ltd signed a letter of agreement with SpectrumGold on its contiguous **Copper Canyon** alkalic porphyry gold-copper project to the northeast of Galore Creek. A 1990 inferred resource for a portion of the Central zone at Copper Canyon was estimated by Consolidated Rhodes Resources Ltd at 35.7 million tonnes grading 1.17 g/t Au, 17.1 g/t Ag and 0.75% Cu.

During 2003, DRC Resources Corp completed a major, diamond-drilling program on its **Afton** alkalic porphyry copper-gold-palladium deposits, 10 kilometres west of Kamloops, testing for deep mineralization beneath the Afton and parallel to the Pothook pits. In December, the company released a mineral resource estimate, using a 0.70% copper-equivalent cutoff, of measured and indicated reserves in the Main Zone of 68 700 000 tonnes, which includes indicated resources of 59 160 000 tonnes grading 1.05% Cu, 0.83 g/t Au, 2.49 g/t Ag and 0.12 g/t Pd. The Afton project has been proposed as a 9000-tonne per day underground (block) panel-cave operation with a mine life of 17 years. The Afton Main zone is about 800 x 90 metres, and extends vertically at least 300 metres below the existing pit. In November, 2003, DRC announced a bought deal, private placement financing with a syndicate of underwriters. Using the net proceeds, of about $24 million, DRC in December started excavating a portal and an underground decline. The decline will provide access for a 25 000-metre definition drilling program, bulk sampling and technical studies. Behre, Dolbear and Co Ltd are commissioned to prepare a feasibility study.

Within the Afton camp, Abacus Mining and Exploration Corp completed a 3-D induced polarization survey and approximately 2000 metres of diamond drilling to test beneath and along strike of its **Rainbow** porphyry copper-gold deposit. The Rainbow property is covered by an agreement involving Teck Cominco Ltd, Discovery Corp Enterprises Inc and Abacus. A resource estimate of 14.1 million tonnes grading 0.5% Cu with significant gold values, to a depth of 300 metres, was calculated by Teck Cominco Ltd in 1966.

Taseko Mines Ltd completed a major diamond-drilling program at its **Gibraltar** porphyry copper-molybdenum mine, northeast of Williams Lake. Gibraltar is a 35 000 tonnes-per-day milling facility, which has had a successful 27-year operating history and has been maintained on a stand-by basis since 1998, awaiting higher copper prices. Approximately 760 million tonnes of measured and indicated resources are outlined, sufficient for a mine life of about 30 years. This includes an estimated in-pit resource, based on a 15-year mine plan, of 189 million tonnes grading 0.31% Cu and 0.01% Mo, at a cutoff grade of 0.2% Cu, additional in-pit oxide resources that would be processed in the existing solvent extraction/electrowinning (SX-EW) plant, and further mineral resources that have not yet been integrated into mine planning. Taseko completed feasibility studies for new refinery facilities, which would decrease the cost of copper production by about US$0.20 per pound.

The 2003 drilling campaign targeted the near-surface, oxide potential of the 98 Oxide zone, about 1 kilometre east-northeast of the Polyanna pit. The objective is to outline an oxide copper deposit that could be heap leached and processed using Gibraltar's SX-EW plant. Drilling also tested strong, induced-polarization anomalies in an area measuring 1200 by 600 metres, approximately 1.2 kilometres southeast of the 98 Oxide zone. The company estimates it would cost about $20 million to restart the mine. At the year end, Taseko announced it was undertaking a financing with Gibraltar Reclamation Trust Ltd Partnership, to partially finance a planned restart of the mine.

In early 2004, Pacific Booker Minerals Inc, in a joint venture with Noranda Inc, plans to conduct a feasibility study of its **Morrison** porphyry copper-gold deposit, 65 kilometres northeast of Smithers. Planning and initial investigations have commenced for project submissions to the provincial Environmental Assessment Process. Between 1998 and 2002, Pacific Booker redrilled the Morrison deposit, delineating an elongated 500 by 1000 metre deposit with 82 diamond-drill holes totaling 22 824 metres on 60-metre spacings. A recent resource estimate commissioned by the company outlines a measured and indicated resource of 12.4 million tonnes grading 0.53% Cu and 0.26g/t Au at a 0.3% Cu cut-off within an optimized starter pit, and 62.1 million tonnes grading 0.46% Cu and 0.22g/t Au at a 0.3% Cu cut-off in an ultimate pit. In December, Pacific Booker announced its intention to examine the potential for mining two higher grade zones on its adjoining Hearne Hill copper-gold property, as part of its overall plans for the Morrison/Hearne Hill project.

In the Kiniskan Lake area, 15 kilometres southwest of Iskut, International Curator Resources Ltd completed an 18-kilometre induced polarization and magnetometer geophysical survey and a Wacker overburden drilling campaign over its **Kiniskan** alkalic porphyry copper-gold property, which includes the former GJ and Quash Creek properties. The property contains east to northeasterly trending satellite alkalic intrusions of the Early Jurassic Groat stock. Mineralization and alteration styles are similar to those observed at the Red Chris porphyry copper-gold project, located 25 kilometres to the east. A new induced polarization anomaly, 1.1 kilometres long (the North zone), was discovered north of the GJ zone. In addition to the bulk-tonnage prospects, the property also hosts several significant gold vein showings, including Gordon, Horn Silver and Trevor Peak. A major diamond-drilling program is planned for 2004.

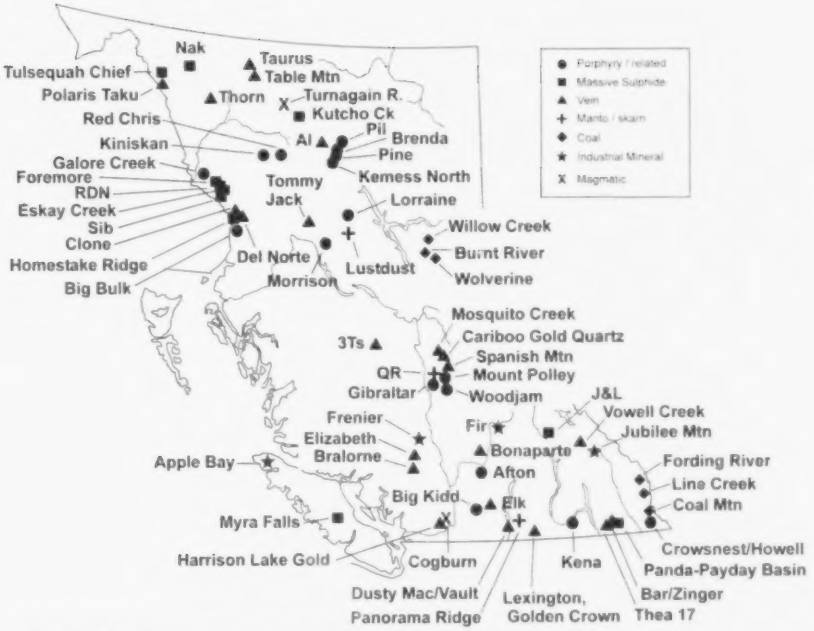
In the Toodoggone region, exploration for porphyry copper-gold deposits, as well as high and low-sulphidation epithermal gold-silver deposits, was fueled by the successes at Northgate's Kemess South and Kemess North projects. Stealth Minerals Ltd conducted an extensive prospecting and sampling program on its 480 square kilometre **Pine** project, adjoining Northgate's Kemess North property on the north. To date, Stealth has identified 12 porphyry gold-copper showings, 15 low and high-sulphidation epithermal gold-silver showings and 3 copper-gold-silver skarn showings. A promising new porphyry showing (**Pine North**) was discovered on the north side of the Finlay River, across from the Pine, Tree and Fin zones. The original Pine deposit, with a previously estimated geological resource of 40 million tonnes grading 0.57 g/t Au and 0.15% Cu, has been traced by 47 drillholes to depths of 200 metres below surface.

Finlay Minerals Ltd conducted a small diamond-drilling program and surface exploration on its **Pil South** and **Pil North** porphyry gold-copper targets, 30 kilometres northwest of the Kemess South mine. At Pil North, Finlay completed 18 kilometres of induced polarization and soil geochemical surveys, prospecting and mapping over an area of approximately 5 by 3 kilometres. The Northwest extension zone is a new discovery of quartz-barite stockwork with copper mineralization hosted by porphyritic monzonite and trachyte. The Northwest zone is a continuation of the Milky Creek zone. The newly outlined WG gold zone was discovered during follow up of the WG base metal zone discovered in 2002. Prospecting and geological mapping during 2003 traced a band of gold mineralization over 100 metres wide which coincides with a high resistivity anomaly more than 4 kilometres long. Exploration of the North East zone was extended 800 metres north of previous programs. A total of seven zones have been outlined in multiphase intrusions of monzonitic to dioritic rocks of the Jurassic Black Lake intrusive suite.

Northgate Exploration Limited, under an option agreement with Canasil Resources Inc, completed a small diamond-drilling program on the **Brenda** porphyry gold-copper property, 25 kilometres north-northwest of the Kemess South mine. Mineralization occurs in quartz-magnetite veins within Takla Group volcanic rocks, in a geological setting similar to the Kemess South and Kemess North deposits.

During 2003, the British Columbia Ministry of Energy and Mines, the Geological Survey of Canada and several mining companies active in the Toodoggone region, paid for a low-level airborne geophysical survey over much of the region. Results are expected to be released in

Figure 10 ...



Selected Exploration Projects in British Columbia - 2003

late-March of 2004. Numerous new claims were staked prior to the commencement of the survey.

GWR Resources Inc continued drill testing its large **Lac La Hache (Ann)** alkalic porphyry copper-gold property, 20 kilometres northeast of Lac La Hache. Drilling targeted southeast-trending magnetic anomalies and intersected several steeply dipping, relatively narrow zones (10 to 30 m wide) within Nicola Group volcanic and monzodiorite intrusive rocks. Mineralization is generally associated with potassic alteration and magnetite.

On the **Woodjam** alkalic porphyry gold-copper property, located 50 kilometres east of Williams Lake, Fjordland Exploration Inc, under an option agreement with Wildrose Resources Inc, completed a 3-hole diamond-drilling program. In 2001, Fjordland completed an induced polarization survey over a 7.5 square kilometre area; a large 1600 by 800-metre chargeability anomaly was defined. Drilling to date, including five holes by Fjordland in 2002, has only tested about 25% of this anomaly. Prospecting and soil sampling in 2003 identified areas anomalous in gold and copper, and led to the discovery of mineralized float 600 metres east of a previously drilled area. Exploration interest in the area has heightened following the recent discovery of the Northeast zone at Mount Polley, 40 kilometres to the north, plus the completion of an airborne geophysical survey by the Ministry of Energy and Mines in the area, as part of the *Rocks To Riches Program*, funded through the British Columbia and Yukon Chamber of Mines.

Fifty kilometres southeast of Stewart, Canadian Empire Exploration Ltd, under an option agreement with Teck Cominco Ltd, drilled the 1200 by 300-metre **Big Bulk** multiphase porphyry copper-gold system. The company examined the potential for both bulk-tonnage copper-gold mineralization and high-grade gold zones. A large alteration and copper-gold stringer system, 4 kilometres in diameter, is associated with a 6 square kilometre intrusive complex. Five copper-gold zones occur within a chlorite-sericite-pyrite alteration envelope surrounding a potassic core within the intrusive rocks. Similar hostrocks occur at the Red Mountain and Sulphurets gold-copper deposits to the north. Drilling resulted in the discovery of visible gold in shallow-dipping, sheeted quartz, calcite and epidote veins within the potassic core of the intensely altered porphyry. All eight holes drilled into the zone intersected intervals of pyrite-chalcopyrite mineralization to an approximate depth of 200 metres.

At the **Kena** intrusion-related gold project near Nelson, Sultan Minerals Inc completed induced polarization surveys, geological mapping, trenching and a 22-hole diamond-drilling program. The programs focused on expanding gold mineralization along a recently identified gold-bearing structural trend in the Gold Mountain and Kena gold zones. In particular, drilling was designed to test the strike and depth continuity of high-grade gold mineralization identified by previous drilling in four locations along the trend. The area of anomalous gold was identified as extending about 1 kilometre, both north and south of the Gold Mountain zone. Drilling also tested the near-surface gold mineralization over part of the Kena gold zone; additional deep drilling is planned. The property has potential for both large-tonnage, low-grade gold deposits, and for high-grade auriferous veins.

Fifty kilometres southeast of Fernie, in the Flathead watershed, Goldrea Resources Corp, under an option agreement with Eastfield Resources Ltd, completed dia-

mond-drilling programs on the **Crowsnest** and **Howell** intrusion-related gold properties. Gold mineralization on both properties is associated with Cretaceous Flathead alkaline intrusions and carbonate-dominant sequences of the Mississippian Rundle Group. On Crowsnest, drilling targeted three areas south of trench TK99-1, from which channel samples collected in 1999 averaged 8.57 g/t Au over 16 metres; the vicinity of drillhole DH02-03 which assayed 0.4 g/t Au over 42.5 metres (including 12 m grading 1.05 g/t Au); and a soil anomaly within a previously identified boulder train southeast of the trench, from which syenite-magnetite-sulphide clasts have assayed up to 620 g/t Au. On Howell, drilling further tested the area west of hole HRC-25, which assayed 1.23 g/t Au over 58 metres. Drilling in this area by Goldrea in 2002 intersected 0.52 g/t Au over 149.4 metres. The spatial association of gold with the alkalic intrusions has led other researchers to compare these properties with the Cripple Creek district of Colorado and the Porgera region of Papua New Guinea.

During 2003, Eastfield Resources Ltd, under an option agreement with Lysander Minerals Corp, focused its efforts on showing its **Lorraine** alkalic porphyry copper-gold property to prospective clients. Three major mining companies reviewed Eastfield's extensive data and conducted field examinations of the property. During one of these visits, new mineralization was discovered in the northern part of the large claim holdings, in the area of the Steelhead showing. Eastfield is very encouraged by the interest shown by the majors; it continues to work on geological modeling for the property.

Christopher James Gold Corp conducted a two-phase trenching and diamond-drilling program on its **Big Kidd** alkalic porphyry gold-copper property, 25 kilometres southeast of Merritt. The objectives were to define the extent and tenor of the known mineralization in the Big Kidd breccia and define additional targets. Previous drilling programs identified broad zones of gold-copper mineralization with core areas 20 metres wide averaging 2 to 3 g/t Au. A high-level volcanic (Nicola Group) intrusive complex is centred on the Big Kidd intrusion breccia and features comagmatic monzodiorite to syenomonzodiorite intrusions and andesitic flows and fragmental rocks. Structurally controlled and disseminated chalcopyrite and pyrite mineralization, with gold values, occurs within the complex. Drilling during 2003 intersected several steeply dipping zones up to 50 metres wide, and extended the North breccia zone 150 metres to the northwest.

Massive Sulphide Deposits

During 2003, Redfern Resources Ltd completed a large underground diamond-drilling program on its **Tulsequah Chief** volcanogenic massive sulphide property southwest of Atlin, designed to expand the current resource and to update the existing feasibility study. Currently defined measured and indicated resources total 5.94 million tonnes grading 2.59 g/t Au, 107.41 g/t Ag, 1.42% Cu, 6.72% Zn and 1.24% Pb together with inferred resources of 3 million tonnes grading 2.42 g/t Au, 107.86 g/t Ag, 1.10% Cu, 6.38% Zn and 1.24% Pb. The focus of the 2003 program was to explore extensions of known zones to moderate depths and the potential on strike to the west. The company discovered a new lens of massive sulphide mineralization, stratigraphically above, and to the west of the Main deposit. The discovery hole (TCU03085) included a 5-metre section grading 1.84 g/t Au, 80.07 g/t Ag, 1.89% Cu, 6.51% Zn, within an 8-metre section of massive sulphides. Redfern considers this discovery offers significant potential to add to the resource base. Drilling also confirmed the continuity of the westerly extension of the H and AB2 lenses near the top of the deposit. Redfern currently holds a Project Approval Certificate to develop the mine.

Late in 2003, Western Keltic Mines Inc announced its pending acquisition of the **Kutcho Creek** volcanogenic massive sulphide property, 100 kilometres east of Dease Lake from Barrick Gold Corporation. Exploration through the 1980s, by Sumac Mines Ltd and Esso Minerals Canada Ltd, defined three sulphide deposits. The largest, the Kutcho deposit, contains an open-pit reserve of 14.2 million tonnes grading 1.76% Cu, 3.47% Zn, 34.2 g/t Ag and 0.34 g/t Au (Wright Engineers prefeasibility study, 1981). The smallest, the Esso West deposit, is open to expansion and contains an inferred resource of 1.5 million tonnes grading 3.37% Cu, 5.71% Zn, 63.4 g/t Ag and 0.54 g/t Au. The third deposit, the Kutcho lens, has a strike length of 1700 metres, a maximum thickness of 40 metres, and extends down-dip for approximately 200 metres. The Kutcho Creek deposits have been delineated by 135 drillholes and past expenditures total more than $20 million in current dollar value. Core from a significant number of the early drillholes was not assayed for gold; Western Keltic believes there is potential for locally improving precious metals grades. Also, some exploration targets were not drill-tested. Western Keltic estimated an indicated resource for the high-grade core of the Kutcho deposit of 6.3 million tonnes grading 2.7% Cu, 4.01% Zn, 46.5 g/t Ag and 0.52 g/t Au and plans to evaluate the potential for underground mining both this and the Esso West deposit.

In 2003, Roca Mines Inc focused its work on the SG area and the BRT/North zones on its 155 square kilometre, gold-rich, massive sulphide **Foremore** property, located approximately 45 kilometres north of the Eskay Creek mine. Geological mapping was completed over parts of the large property; a felsic dome complex with VMS potential was identified. Of particular interest is an area approximately 1 kilometre to the northeast of the SG zone, where mapping indicates a favourable environment for VMS accumulation. Previously, Cominco Limited had identified geophysical anomalies in this area. The newly discovered BRT showing, above the northern part of the North Boulder Field and approximately 3.5 kilometres west of the SG zone, consists of a massive sulphide horizon within quartz-sericite schists. The width of the exposed mineralized horizon ranges from 0.8 to 2.4 metres. An induced polarization survey over the BRT area identified a chargeability high coincident with the showing and along

TABLE 2 - Major Exploration Projects - 2003

Property	Operator	MINFILE	NTS	Commodity	Deposit Type	Work Done
Abo Gold (Harrison Gold)	Northern Continental Resources Ltd / Eagle Plains Resources Ltd	92HSW092	93H/05E, W	Au, Ag, Zn, Cu	Mesothermal vein	4 ddh, 682 m; trenching, 15 km of road rehab
Afton	DRC Resources Corp	092INE023	92I/10E	Cu, Au, Pd, Ag	Alkalic porphyry	est. 27 ddh, 15 000 m of definition drilling; scoping study; IP; road work
Al	Bishop Resources Ltd	094E 079	94E/06	Au, Ag	High-sulphidation epithermal	10 ddh, 712 m; compilation; deposit modeling
Ann North	GWR Resources Inc	092P 115	92P/14W	Cu, Au	Alkalic porphyry	est. 14 ddh, 2400 m
Apple Bay (Pem 100)	Electra Gold Ltd	92L 150, 269, 308	92L/12E	Chalky geyserite	Industrial mineral	30 000 t bulk sample; approx 20 ddh, 1200 m; environmental studies
Ash/Pit	Klondike Gold Corp	82GNW070	82G/12W	Pb, Zn, Ag	Sedex	4 ddh, 1548 m
Barnes Creek	Columbia Yukon Explorations Inc	none	82L/01W	Au	Mesothermal vein	5 trenches, approx. 750 m; geochem, 1527 soils
Big Bulk	Canadian Empire Exploration Corp	103P 016	103P/11W	Cu, Au	Calcalkalic porphyry	geol, 11 ddh, 1664 m
Big Kidd	Christopher James Gold Corp	092HNE074	92H/15E	Cu, Au	Alkalic porphyry	est 9 ddh, 2400 m
Blubber Bay	Ashgrove Cement Company		Texada Island	Dolomite	Industrial mineral	approx 29 holes, 1200 m
Bonaparte	North American Gem Inc	092P 050	92P/01W	Au, Ag	Mesothermal vein	14 ddh, 400 m; trenching and stripping; u/g development
Brenda	Northgate Exploration Ltd	094E 147	94E/07E	Au, Cu	Calcalkalic porphyry	5 ddh, 1485 m
Burnt River	Western Coal Corp	093P 007-008	93P/05W	Coal	Sedimentary	est 11-12 pdh, 1500-2000 m
BRX	Mill Bay Ventures Inc			Au, Ag	Mesothermal vein	est 9 ddh, 696 m; 30 trenches; geochem
BX	Goldrea Resource Corp & Golden Chalice Resources Inc	104B new	104B/10W	Au, Cu, Ag	Mesothermal vein	geol; 3 ddh, 509 m
Cariboo (Most Likely)	Cross Lake Minerals Ltd / Gold Giant Ventures Inc	none	93A/12E	Au, Ag	Epithermal vein	access, grid; geol; geochem; geophys; 6 ddh, approx 1400 m
Cariboo Gold Quartz (Bonanza Ledge)	International Wayside Gold Mines Ltd	093H 019	93H/04E	Au	Replacement	est 27 ddh, 2500 m; 10 000 t u/g bulk sample
Clone	Lateegra Resources Corp	103P 251	103P/13W	Au	Shear vein	8 ddh, ~600 m
Coal Mountain Mine	Fording Coal Ltd	082GSE052	82G/07E, 10E	Coal	Sedimentary	37 rcdh, 5975 m
Cranbrook Gold Generative	Chapleau Resources Ltd		82F, 82G	Au	Intrusion-related and structurally controlled veins	Regional compilation; soil geochem; rock sampling
Crowsnest	Goldrea Resources Corp	082GSE070	82G/02E	Au	Intrusion-related	5 ddh, ~300 m
DA Vent	Klondike Gold Corp	082GSW067	82G/05W	Pb, Zn, Ag	Sedex	1 ddh, 1171 m
Dauntless	SYMC Resources Ltd	92F 168	92F/02W	Cu, Ag	Mesothermal vein	road; prosp; geol; trenching
Del Norte	Lateegra Resources Corp	104A 161	104A/04E	Au, Ag, Zn	Mesothermal vein	7 ddh, ~1000 m
Dusty Mac	Ecstall Mining Corp	082ESW078	82E/05E	Au, Ag	Epithermal vein	5 ddh, 1213 m
Elizabeth	J-Pacific Gold Inc	092O 012	92O/02E	Au, Ag	Mesothermal vein	trenching; road; geochem; geol
Elkhorn West	Westroc Inc	082JSW028, 021	82J/05W	Gypsum	Evaporite	66 ddh, 3656 m
Elk (Siwash North)	Almaden Minerals Ltd	092HNE096	92H/16W	Au, Ag	Mesothermal vein	30 ddh, 6569 m
Elkview Mine	Elkview Coal Corp	082GNE015	82G/10W, 15W	Coal	Sedimentary	62 rcdh, 4672m
Eskay Creek	Barrick Gold Corp	104B 008	104B/09W	Au, Ag	Epithermal VMS	geol; 28 surface ddh; 16 328 m; u/g exploration ddh; 17 172 m
Eskay Regional (SIB, Bonsai, Treaty Creek)	Heritage Explorations Ltd	104B 376, 383, 078	104B/09, 10	Au, Ag	Epithermal VMS	14 ddh, 3800 m; geol; geochem
Fir	Commerce Resources Corp	083D 035	83D/06E	Ta, Nb, Phosphate	Carbonatite	geochem; grid; prosp; geol
Fording River Mine	Fording Coal Ltd	082JSE009, 010, 012	82J/02W	Coal	Sedimentary	84 rcdh, 7699 m
Foremore	Roca Mines Inc	104G 148	104G/02W	Cu, Zn, Ag, Au	VMS	geol; prosp; contour soil geochem; 17 km channel sampling; 90 m Max-Min EM; 13.6 line-km; 11 ddh, 1031 m
Franklin	Tuxedo Resources Ltd	082ENE051, 033, 002	82E/09W	Au	Epithermal / mesothermal vein	trenching; 9 ddh, 491 m
Frenier	BBF Resources Inc	092O 072	92O/08W	Perlite	Industrial mineral	180 t bulk sample; processing & market testing
Galore Creek	SpectrumGold Inc	104G 090, 092, 095, 099	104G/03W	Cu, Au, Ag	Alkalic porphyry	geol; 8 ddh, 2947 m; reclamation
Georgia River	Mountain Boy Minerals Ltd	103O013	103O/16E	Au, Ag	Mesothermal vein	20 ddh, 1010 m
Gibraltar	Taseko Mines Ltd	093B012	93B/09W	Cu, Mo	Calcalkalic porphyry	est 33 000 m of drilling
GJ (Kinaskan)	International Curator Resources Ltd	104G 034	104G/09E	Cu, Au	Alkalic porphyry	airborne EM-Mag, 1300 line-km; IP & mag, 16 line-km; 254 overburden holes
Golden Crown	Gold City Industries Ltd	082ESE032, 033	82E/02E	Au, Cu	Mesothermal vein	47 ddh, 2139 m
Greenhills Mine	Fording Coal Ltd	082JSE001, 005, 007	82J/02W	Coal	Sedimentary	32 rcdh, 4400 m
Homestake Ridge	Teck Cominco Ltd	103P 216, 082, 093	103P/12E	Au, Ag, Pb, Zn	Intrusion-related; epithermal; VMS	geol; 11 ddh, 1001 m
Iron Ross / Iron Mike	Hillsborough Resources Ltd	92K 043	92K/05W	Magnetite	Industrial mineral	percussion drilling; bulk sample; road upgrading
Jubilee Mountain	Tiger Ridge Resources	082KNE079	82K/16W	Barite	Veins, breccias	31 ddh, 2086 m; 1000 t bulk sample; 55 m drifting, 22 m raising
Kalum	Eagle Plains Resources Ltd	103I 018, 019, 020, 021, 173, 174, 211, 213	103I/10, 15	Au	Intrusion-related gold mesothermal vein	geol; prosp; silt, soil & rock geochem
Kemess North	Northgate Exploration Ltd	094E 021	94E/02	Au, Cu	Calcalkalic porphyry	27 ddh, 10 003 m exploration drilling; airborne geophys; infill, geotech & oriented core drilling; pre-feasibility & feasibility studies

its strike. Roca drilled seven short holes and intersected semi-massive to massive sulphides within felsic volcanic rocks, up to 40 metres in thickness, between graphitic sediments and overlying mafic volcanic rocks. The horizon that hosts the BRT showing has been traced over a 2.5-kilometre strike length. Follow-up drilling is planned for 2004. On the SG zone, Roca completed four short holes prior to completing its mapping and interpretation. Roca conducted a ground max-min electromagnetic survey to refine drilling targets; the survey has delineated a 200-metre long anomaly. Approximately 1.2 kilometres south of the 2002 SG discovery area, Roca discovered gold-enriched, felsic-hosted volcanogenic massive sul-

TABLE 2 - Major Exploration Projects - 2003 - Cont'd

Property	Operator	MINFILE	NTS	Commodity	Deposit Type	Work Done
Kena	Sultan Minerals Inc.	082FSW237, 331, 332	82F/06W	Au, Ag, Cu	Intrusion-related	22 adh; 1100 m; trenching, geol, geochem, geophys, airborne
Lehigh Central Texada	Lehigh Northwest Cement / Chemical Lime Company of Canada Ltd.		92F/10E	Limestone	Industrial mineral	~1200 m drilling, 4 km trenching
Lexington	Gold City Industries Ltd.	082EESE341, 342	82E/02E	Cu, Au	Mesothermal vein	5 adh; 306 m
Line Creek Mine	Luscar Ltd.	082GNE020, 021, 022	82G/15W, E	Coal	Sedimentary	33 roth; 4400 m
Loco (Peter Vein) [Bralorne]	Bralorne-Pioneer Gold Mines Ltd.	92JNE164	92J/15W	Au, Ag	Mesothermal vein	1500 m drilling, underground development, 6000 t bulk sample
Lodestone Mountain	Sargold Resource Corp.	092HSE034	92H/07E	Fe, V, Pt, Ti	Magmatic	15 adh; 975 m (planned)
Lookout (Bar)	Chapleau Resources Ltd.	082GSW068	82G/05W	Au	Intrusion-related	17 adh; 3358 m
Lustdust	Alpha Gold Corp.	093N 008, 009	93N/11W	Au, Ag, Zn, Cu, Pb	Skarn, manto, porphyry	geol, soil geochem, trenching, 42 adh; 1239 m
Morrison	Pacific Booker Minerals Inc.	093M 007	93M/01W	Cu, Au	Calcalkalic porphyry	8 adh; 2420 m, engineering and environmental studies
Mosquito Creek Gold	Island Mountain Gold Mines Ltd.	093H 010	93H/04E	Au	Replacement, mesothermal vein	geochem, trenching, drill access, 13 adh; 1240 m
Mount Polley (Northeast, Springer & Bell zones)	Imperial Metals Corp.	093A 008	93A/12E	Cu, Au	Alkalic porphyry	trenching & 18 adh; 3221 m completed on Northeast zone, est 10 adh; 4000 m on Springer & Bell pits, airborne geophys
Myra Falls	Boliden Westmin (Canada) Ltd.	92F 330, 071, 072, 073	92F/12E	Cu, Zn, Pb, Au, Ag	VMS	u/g exploration drilling, approx 33,500 m
Myrtle	International Wayside Gold Mines Ltd.	093H 025	93H/04E	Au	Mesothermal vein	15 adh; 3000 m
Nak (Joss'alun)	Imperial Metals Corp.	104N 136	104N/2W	Cu	VMS?	geol, soil geochem, EM, 8 adh; 1511 m
Northstar (Fred)	Northern Hemisphere Development Corp.	094D 032	94D/01W	Cu, Ag	Volcanic redbed	geol, grid, soil & rock geochem, IP, gravity, road trenching, drilling planned
New Polaris	Canarc Resource Corp.	104K 003	104K/12	Au	Mesothermal vein	3 adh; 1554 m
Panorama Ridge	Goldcliff Resource Corp.	082ESW052	82E/05W	Au	Skarn	17 adh; 1920 m drilling, trenching, geol, IP geophys, geochem
PBR	Roca Mines Inc.		104B/15E	Au, Ag	Epithermal VMS	deepen 1 adh; 351 m
Perry Creek (Wolverine)	Western Canadian Coal Corp.	092P 015	92P/03W	Coal	Sedimentary	est 10 adh; 1000 m, spot coring, pre-feasibility studies
Pil North & Pil South	Finlay Minerals Ltd.	094E 029, 053, 213 & 215	94E/07	Cu, Au	Calcalkalic porphyry	grid, prosp, geol, geochem, IP, mag, 3 adh; 675 m, airborne geophys
Pine (VIP, Wrich Hill, Electrum/Beaver Pond)	Stealth Minerals Ltd.	094E 047-048, 094E 052	94E/02E	Au, Ag, Cu	Porphyry, skarn, high & low-sulphidation epithermal vein	prosp, geol, grid, geochem, IP, mag, airborne geophys, trench, 20 adh, est 3000 m
Praxis	Praxis Goldfields Inc.		103P/12W	Au, Ag	VMS	3 adh; approx 1239 m
QR	Cross Lake Minerals Ltd. / Gold Giant Ventures Inc.	093A 121	93A/12W	Au	Skarn (propylitic)	grid, 30 IP, mag, geochem, drill access, 6 adh; 599 m completed in phase 1, late fall drilling, scoping study
Quinsam	Hillsborough Resources Limited	092F 319	92F/14W	Coal	Sedimentary	Planned 6 adh; 900 m
Rabbit North	Aurera Ventures Inc.	092INE045, 147, 130, 114, 071	92I	Cu, Au	Alkalic porphyry, vein	11 adh; 1650 m, 8 trenches planned
Rainbow (Afton Area)	Abacus Mining and Exploration Corp.	092INE028	92I/09W	Cu, Au, Ag, Pd	Alkalic porphyry	4adh; 1965m; 3D IP
Randi	Locke B. Goldsmith	092ISW054	92I/04E	Au, Ag, Cu	Mesothermal vein	31 adh; 2083 m; 3 trenches
Red Chris	bcMetals Corp.	104H 005	104H/12W	Cu, Au	Alkalic porphyry	49 adh; 16 123 m
Skutsil Knob	Kit Resources Ltd. / Hathor Exploration Ltd.	093M 117	93M/15	Cu	Volcanic redbed	5 adh; 444 m
Table Mountain	Cusac Gold Mines Ltd.	104P 070	104P/04	Au	Mesothermal vein	drill access, 300 m; 2 adh; 626 m
Taurus	Navasota Resources Ltd.	104P 010, 011, 012	104P/05E	Au	Mesothermal vein	drill access, 2.5 km; 13 adh; 1974 m
Thorn	Cangold Ltd.	104K 031	104K/10W	Au, Ag, Cu	High-sulphidation vein	excavator trenching, 500 m; 8 adh; 874 m
3Ts (Tsacha, Tam & Taken)	Southern Rio Resources Ltd.	093F 055, 058	93F/02W, 03E	Au, Ag	Epithermal vein	prosp, geochem, seismic, radar, excavator trenching, drill access, est 20 adh; 3000 m
Tommy Jack	International Kodiak Resources Inc.	094D 031	94D/04E	Au	Intrusion-related	geol, IP, 20 line-km, 5 adh; 1100 m
Trend (Roman Mtn.)	NEMI Northern Energy & Mining Inc.		93I/15W	Coal	Sedimentary	30 roth; 3500 m, spot coring, pre-feasibility studies
Tulameen (DP Zone)	Bright Star Ventures Ltd/Cusac Gold Mines Ltd.	092HSE120, 142, 035, 039	92H/07W	Cu, Pt, Pd, Au	Magmatic?	4 adh; approx 600 m, geochem (1996 work), prosp, trench, channel sampling
Tulsequah Chief	Redfern Resources Ltd.	104K 002	104K/12E	Cu, Zn, Ag, Au	VMS	2 surface adh; 1075 m; 21 u/g adh; approx 6650 m
Turnagain	Canadian Metals Exploration Ltd.	104I 014	104I/07W	Ni, PGE	Magmatic	23 adh; 8624 m
Valentine Mountain	Beau Pre Explorations Ltd.	092B 108	92B/12W	Au, Ag	Mesothermal vein	3 adh; 900 m completed and one 500 m hole planned for Dec, environmental studies
Vowell Creek	Jasper Mining Corp.	082KNE309, 011, 031, 037	82K/15W	Au, Ag, Cu, Pb, Zn	Mesothermal vein, replacement	21 adh; 2900 m
West Moyie Block	Klondike Gold Corp.		82F/08E	Pb, Zn, Ag	Sedex	2 adh (1 extension); 1535 m
Westport	Williams Creek Explorations Ltd.	093H 027, 034	93H/04E	Au	Replacement	drill access, 5 adh; approx 1000 m, IP
William's Gold	Stikine Gold Corp.	094E 092, 150, 162, 163	94E/13	Au	Intrusion-related	11 adh; 2856 m
Wood, Beaton	Green Valley Mine Inc. / Lakewood Mining Co Ltd.	092INE155	92I/10E	Cu	Alkalic porphyry	8 adh; 3103 m, IP, geochem
Woodjam	Fortland Exploration Inc.	093A 076	93A/06W	Au, Cu	Alkalic porphyry	geochem, 1 adh; 461 m
Zinger	Chapleau Resources ltd.	082FSE122	82F/08E	Au	Mesothermal vein	20 adh; 3317 m

phide mineralization in the Sunday zone over an area measuring 350 by 500 metres.

Bravo Venture Group Inc, under an option agreement with Teck Cominco Ltd, diamond drilled several Eskay Creek-type targets on the **Homestake Ridge** property, 30 kilometres south of Stewart. The property covers over 7 kilometres of favourable Hazelton Group stratigraphy and over 80 separate precious and base metal mineral occurrences. Previous work by other operators identified at least five high-grade, gold-enriched volcanogenic massive sulphide and epithermal targets associated with intermediate to felsic dome complexes and intrusions. Eleven drillholes were completed in 2003, testing the Homestake showing, the Silver Crown showing, the Fox-

Gold Reef showing, the Dilly vein, and elsewhere along the rhyolite-argillite contact. The company is encouraged by a drill intercept of 9.8 g/t Au over 3 metres in a quartz-pyrite stockwork and breccia at the contact with the Goldslide pluton. A more extensive drilling program is planned for 2004.

In the Eskay Creek area, Heritage Explorations Ltd completed a 14-hole, 3900-metre diamond-drilling program. The Hexagon zone, a broad new zone (75 to 185 m wide and nearly 4 km long) of extensive alteration and sulphide mineralization, was intersected by seven holes. On the Bonsai prospect, a zone of extensive alteration and sulphide mineralization was intersected in one of three holes. Three holes were completed on the Pie area (Battleship Knoll) and one on the Lulu zone of the **Sib** property. Planned drilling on the Treaty Creek property and the TV-Jeff zone was postponed until 2004.

On the **Nak** massive sulphide property, which includes the Joss'alun high-grade copper discovery made by the British Columbia Geological Survey Branch in 2002, Imperial Metals Corp, under a joint venture agreement with Copper Ridge Explorations Inc, completed geophysical and geochemical surveys and a modest diamond-drilling program. The property is located 75 kilometres southeast of Atlin. The mineralized trend of the original Joss'alun showing was extended from 225 metres to over 5 kilometres. Two new zones of copper mineralization were identified: the Box Lake and the Jennutsy showings, to the southeast and northwest of the Joss'alun showing. Follow-up drilling focused on the Joss'alun and Jennutsy showings. On the former, drilling intersected widespread copper mineralization, as stringers, disseminations and pods of mainly chalcopyrite, hosted by volcanic stratigraphy of the Cache Creek Group. Highlights included hole NAK-03-05 with 17.75 metres grading 0.94% Cu and hole NAK-03-97 with 53.45 metres grading 0.34% Cu. Another new showing, BOR, located 2.3 kilometres northwest of the Joss'alun showing, contains structurally controlled chalcopyrite-rich veins within a gabbro lying immediately beneath the volcanic package that hosts most of the copper mineralization discovered to date.

Klondike Gold Corp continued deep stratigraphic drilling to test its best Sullivan-type sedex targets in the Purcell Basin. Holes were completed at two locations within the **Panda-Payday** sub-basin, the **Fran** hole drilled in 2002 in the DA Vent sub-basin was deepened to intersect the Lower Middle Aldridge contact (LMC), one hole was drilled on the Spid claims near the intersection of the Spider and Kid Creek and several holes were drilled on the **Ash (Pit)** property, within the Sullivan/North Star sub-basin, 9 kilometres south of the Sullivan mine. Anomalous mineralization was observed at the LMC in one of the Ash/Pit holes, in the Fran hole and in the southerly Panda-Payday sub-basin holes. Also in the Sullivan camp of southeastern British Columbia, Stikine Gold Corp has acquired an option to earn a 50% interest in ground held by Teck Cominco Ltd, immediately north of the Kimberley fault and approximately 4 kilometres northwest of the famous Sullivan mine. Cominco Limited drilled a number of deep holes during three decades of exploration for the northern continuation of the Sullivan/Northstar trend. The final hole, completed in 1996, cored distinctive hangingwall stratigraphy to the Sullivan horizon, then passed through a fault before terminating in footwall rocks. Modeling of a down hole UTEM survey of this hole identified a large, sheet-like conductor to the east of the hole at the prospective LMC area.

Late in 2003, BacTech Enviromet Corp acquired an option to purchase 100% of the **J&L (McKinnon Creek)** gold deposit, 45 kilometres north of Revelstoke. There are two main deposits on the property; the Main zone that hosts the gold resource and is the focus of BacTech's attention, and the Yellowjacket zone, which is a Zn-Pb-Ag (Irish-type) carbonate replacement deposit. The Main zone is a continuous, tabular, structurally-controlled arsenopyrite and precious metal-bearing massive sulphide body, hosted by a low angle, intensely sheared structure. It has been traced on surface and underground for over 3 kilometres and currently has a drill-indicated strike length of 1.8 kilometres. The average thickness is 2.5 metres, with a maximum thickness of 10 metres. Drill-indicated geological resources for the Main zone, as published by H.A. Simons in 1996, show a total resource of 3.6 million tonnes grading 7.24 g/t Au and 81 g/t Ag. Work planned for 2004 includes a prefeasibility study, as well as baseline environmental assessment and drilling.

Precious Metal Veins and Bulk-mineable Deposits

International Wayside Gold Mines Ltd's claim holdings in the historic Wells-Barkerville area cover a strike length of approximately 50 kilometres that includes the former producing Cariboo Gold Quartz, Aurum, Island Mountain, Mosquito Creek Gold, Cariboo Hudson, Cariboo Thompson and Hardscrabble Tungsten mines. The company continued to explore several targets on its **Cariboo Gold Quartz** mesothermal gold project, from the Bonanza Ledge zone northwest to the Mosquito Creek Gold mine. Surface drilling targeted strike and dip extensions on the Bonanza Ledge zone, both diagonal and orthogonal quartz veins within the Rainbow unit and replacement mineralization along the main BC vein/Bonanza Ledge trend.

Development work at the Bonanza Ledge zone consisted of an underground decline to the high-grade core, 150 metres from the portal. Additional drilling was completed on the Bonanza Ledge zone in preparation for mining a 70 000-tonne bulk sample in 2004. The Bonanza Ledge prospect has been interpreted to be a zone of auriferous replacement mineralization comprising at least five parallel, lenticular subzones.

The combined probable mineral reserve from Cow Mountain and Bonanza Ledge is 3.1 million tonnes grading 2.95 g/t Au. An underground drilling program is planned for Cow Mountain (Sanders, Pinkerton and Rainbow zones).

On the eastern flank of Island Mountain, International Wayside, under an option agreement with Island Mountain Gold Mines Ltd, trenched and drilled an area approximately 500 metres south of the Kutney zone on the **Mosquito Creek Gold** property. A northwest-trending zone, 730 metres long, with quartz-pyrite+/-arsenopyrite+/-galena+/-visible gold veins and associated quartz stockworks, is hosted by silicified limestone and pyritized phyllitic quartzite. The company interprets it to be part of the Bonanza Ledge stratigraphy, approximately 300 metres below the mine trend. Both vein and replacement mineralization are present.

On the **Myrtle** property, 0.2 kilometre east of the Bonanza Ledge zone, International Wayside, under an option agreement with Gold City Industries Ltd, completed a modest trenching and drilling program. The newly discovered shear-hosted, auriferous quartz-sulphide Ethel vein was drilled. Golden Cariboo Resources Ltd completed soil geochemical surveys over much of its 28-kilometre strike extent of folded favourable stratigraphy to the southeast of the Bonanza Ledge zone. Key areas were sampled on the **G, Maude Creek** and **Cariboo Hudson** properties, targeting a magnetite-bearing porphyroblastic unit identified in the hangingwall of the Bonanza Ledge stratigraphy.

At Williams Creek Exploration Ltd's **Westport** mesothermal gold property, adjacent to the Bonanza Ledge project, a small drilling program tested a possible easterly extension of the Bonanza Ledge gold zone. A high-chargeability and low-resistivity geophysical anomaly, with more than a kilometre of strike length, is coincident with the projection of the Bonanza Ledge zone onto the company's holdings.

In 2003, Almaden Minerals Ltd completed a major drilling program with a view to reopening its **Elk (Siwash North)** mesothermal gold-silver mine, 45 kilometres southeast of Merritt. In the 1990s, the mine yielded 1600 kilograms (51 750 oz) of gold from 16 700 tonnes of open-pit and underground ore. Prior to this year's drilling, the total resource on the property was reported at 101 300 tonnes grading 43.6 g/t Au. This year's program tested the WD vein, parallel to the Siwash North vein. A deep hole, drilled in 2002, intersected a 2.15-metre interval assaying 19.4g/t Au. The company is reviewing permitting issues for a 150 tonne-per-day, gravity and flotation mill (recently purchased in Alaska) and an underground mine.

Bralorne-Pioneer Gold Mines Ltd began assembling a 150 tonne-per-day mill and construction of a tailings pond (approved in 1996) at its **Bralorne** mesothermal gold property, 125 kilometres north of Vancouver. The company plans to process a 6000-tonne bulk sample from the Peter vein on the Loco property in 2004. The Loco property is a northerly extension of the Bralorne vein system, separated from it by a major fault, which has displaced the Peter, Millchuck, Maddy and Big Solly veins by some 365 metres. During 2003, the company outlined a block of mineralization in the Peter Vein, 60 metres long, 15 metres in height and 1.2 metres thick. In 2001, a 21-metre raise in the upper Peter adit averaged 25 g/t Au over an average width of 1.34 metres. The Bralorne-Pioneer mine, closed since 1971, produced approximately 129 000 kilograms (4.15 million oz) of gold and 29 650 kilograms (0.95 million oz) of silver since 1900.

Southern Rio Resources Ltd, under separate option agreements with Teck Cominco Ltd and Phelps Dodge Corporation of Canada Ltd, carried out a two-phase, diamond-drilling program on the **3Ts** epithermal gold-silver property, located approximately 125 kilometres southwest of Vanderhoof. The project includes the contiguous Tsacha, Tam and Taken properties. To date, nine mineralized veins have been discovered. In 2002, Southern Rio reported an inferred resource of 470 000 tonnes grading 7.4g/t Au and 65.22 g/t Ag, at a 4 g/t Au cut-off, for the Tommy vein on the Tsacha property. In early 2003, drilling focused on the Ted vein system and the Mint zone, 500 metres to the north, on the Tam property. To date, the Ted vein has been defined over a strike length of about 350 metres, from surface to a depth of 120 metres, with estimated true widths between 8 and 14 metres. The company reported very encouraging results (*e.g.* hole TT-16: 28 metres grading 3.78 g/t Au and 137.5 g/t Ag). Drilling on the Mint zone intersected wide zones of quartz veining in altered rhyolite hostrocks. Prospecting and mapping resulted in the discovery of the Ringer zone on the southwestern part of the Taken property. This new zone consists of several large, angular boulders of quartz vein material up to 2 metres in maximum dimension, variably mineralized with base metal sulphides and carrying gold and silver. Eight samples returned an average of 19.01 g/t Au and 140.1 g/t Ag. The late-season drilling program focused on resource definition drilling on the Ted vein and a parallel vein system (East Ted zone).

In the Greenwood camp, Gold City Industries Ltd conducted significant exploration programs on its Lexington and Golden Crown mesothermal gold-copper properties. On the **Lexington** project, it drilled the Grenoble/Main zone, comprising auriferous pyrite-chalcopyrite veins hosted by dacite near a low-angle contact with serpentinite. Hole 03GC-0 intersected 4.57 metres grading 28.68 g/t Au and 1.17% Cu. Two styles of mineralization were encountered in the drilling: auriferous sulphide-bearing veins and a porphyry copper-molybdenum-gold system. Drillholes were located 15 metres apart to provide data for a resource calculation. Samples were also collected for metallurgical test work. Bulk sampling is planned for early 2004. On the **Golden Crown** project, 5 kilometres to the northeast, the company completed a 21-hole definition drilling program on the steeply dipping, King massive sulphide vein. Mineralization comprises pyrrhotite-pyrite-chalcopyrite-native gold in a predominantly quartz gangue, which the company believes is similar to the auriferous mesothermal veins in the historic Rossland camp. Drillholes tested the area between surface and the access drift (about 70 m below) on 15-metre centres with the intent of adding resources in previously untested areas. Significant intersec-

TABLE 3 - New Discoveries and Prospecting Highlights - 2003

Property or Claim Name		Location	Operator	Type
Big Bulk	New gold zone	50 km SE of Stewart	Canadian Empire Expl'n	Porphyry Cu-Au
Del Norte	Horatio zone	30 km ENE of Stewart	Lateega Resources Corp	Vein - Mesothermal
Eskay Creek	22 zone area	80 km NNW of Stewart	Barrick Gold Corporation	Epithermal - VMS
Elizabeth	Southwest vein	60 km NW of Lillooet	J-Pacific Gold Inc	Vein - Mesothermal
Findlay	Blue Hammer showing	45 km NW of Cranbrook	Eagle Plains Resources Ltd	Gemstone - Aquamarine
Foremore	BRT zone	45 km NNW of Eskay	Roca Mines Inc	VMS - Kuroko
FR		40 km N of Stewart	Mountain Boy Minerals Ltd	Vein - Mesothermal
Harrison Lake	Klatt zone	50 km N of H Hotsprings	Int'l Peruminas	Magmatic Ni-Cu-PGEs
Kalum	Tuppie & Tojo	50 km N of Terrace	Eagle Plains Resources Ltd	Intrusion-related
Kiniskan	North zone	15 km SW of Iskut	Int'l Curator Resources Ltd	Porphyry Cu-Au
Mount Polley	Northeast zone	56 km NE of Williams Lk	Imperial Metals Corp	Porphyry Au-Cu
Nak	Box Lk., Jennutsy and BOR showings	75 km SE of Atlin	Imperial Metals Corp	VMS - Besshi
Botany Inlet Gold		8 km SE of Tasu	Neil Froc	Vein - Mesothermal
Pil North	NW Extension / WG zones	30 km N of Kemess South mine	Finlay Minerals Ltd	Porphyry Au-Cu
Pine	Sickle Creek	40 km N of Kemess South mine	Stealth Minerals Limited	Vein - Epithermal
Star	Haslinger zone	13 km NE of Aitken Lake	Minterra Resources	Magmatic Cu-PGEs
3Ts	Ringer zone	125 km S of Vanderhoof	Southern Rio Resources Ltd	Vein - Epithermal
Thorn	Oban Breccia zone	120 km SE of Atlin	Cangold Limited	Vein - Epithermal
Titan		30 km W of Atlin	Eagle Plains Resources Ltd	Porphyry Mo
Tulsequah Chief	New lens	160 km S of Atlin	Redfern Resources Ltd	VMS - Kuroko

tions from the drilling included 1.86 metres grading 362.82 g/t Au and 0.39% Cu (hole 03CDH-01) and 1.25 metres grading 72.14 g/t Au and 1.31% Cu (hole 03CDH-03). A further 26 holes tested other vein targets in the same area as the King vein. Gold City is proceeding with metallurgical testwork on the King vein material.

Under an option agreement with Rimfire Minerals Corp, Cangold Limited drilled the Oban Breccia zone on the **Thorn** high-sulphidation, intrusion-related silver-gold-copper property, 125 kilometres northwest of Telegraph Creek. The property covers 17 significant vein showings containing varying amounts of pyrite, enargite, tetrahedrite and boulangerite over a 5 by 5 kilometre area. Drilling tested the core of a very strong, 100 by 300 metre, multi-element soil geochemical anomaly. Higher grade material, over an area roughly 20 to 25 metres wide, was intersected within a lower grade envelope, which appears to have an overall width of 60 metres, and extending at least 130 metres downdip. Mineralization is hosted by a heterolithic breccia with a matrix of black rock flour and approximately 5% pyrite with lesser amounts of sphalerite and boulangerite. The higher-grade mineralization is typically associated with zones of increased sulphide/sulphosalt content, commonly forming rims on breccia fragments. The discovery hole (THN03-19) intersected 38.6 metres grading 1.22 g/t Au and 103.2 g/t Ag. A higher grade core of mineralization was intersected over 14 metres grading 1.97 g/t Au, 190 g/t Ag, 1.33% Pb and 0.77% Zn. Cangold and Rimfire believe that the Oban Breccia zone is developing into a significant bulk-tonnage Ag-Au-Pb-Zn target. Regionally, the Thorn prospect is one of several within the newly defined Late Cretaceous, northwest-trending belt of rocks, at least 10 kilometres wide by 50 kilometres long.

In the Cassiar area, Navasota Resources Ltd, under an option agreement with International Taurus Resources Ltd, conducted a modest diamond-drilling program on its **Taurus (Cassi-Ore)** mesothermal gold project. Drilling tested several of the known east-trending gold zones and some gaps in the previous drilling. The focus was a 700-metre interval containing the Taurus West, Highway and 88 Hill zones. Broad zones of carbonate alteration within pillowed to massive basalts host swarms of steeply dipping quartz veins with abundant disseminated pyrite in the wallrock and local fine-grained pyritic zones with little quartz veining. In 1999, a total inventory of 62 397 500 tonnes grading 0.8 g/t Au was reported by previous operators, International Taurus and Cyprus Canada Ltd. The largest zone, 88 Hill, was estimated to contain a drill-indicated resource of 11 361 000 tonnes grading 1.08 g/t Au. Navasota is examining both the high-grade and low-grade potential of the property. Also in the Cassiar gold camp, Cusac Gold Mines Ltd completed two diamond-drill holes on the Gap zone at its **Table Mountain** gold mine. The mine has been on care and maintenance status since 1999. In 2002, drilling defined a resource of 22 000 tonnes grading 33.78 g/t Au on the east extension of the Bain vein.

In the Toodoggone region, Bishop Resources Inc, under an option agreement with Guardsmen Resources Inc, acquired the Al and Lawyers epithermal gold-silver vein properties. On the **Al (Bonanza)**, some 20 000 metres of shallow diamond drilling was completed in 960 holes funded by six companies during the period 1979 to 2001. This drilling identified several zones of high-grade gold mineralization over limited strike lengths. A total of 19 mineralized zones have been outlined. After compilation of all previous exploration data, Bishop completed a tightly-spaced, diamond-drilling program testing for

high-grade gold mineralization in the near-surface Bonanza-Ghost pit area, which was excavated by Cheni Gold Mines Ltd in 1990-1991. The limited drilling program in 2003 confirmed the structural continuity of the Bonanza zone, as well as the continuity of the gold grade within the structure and the presence of a very high grade core to the mineralized zone (*e.g.* hole A03-07 returned 5.8 m grading 27.85 g/t Au). On its **Lawyers** property, from which Cheni Gold Mines produced approximately 5300 kilograms (171 000 oz) of gold and 112 000 kilograms (3.6 million oz) of silver between 1989 and 1992, Bishop developed drill targets for 2004 by trenching, geochemical sampling and prospecting of several zones of known mineralization that remain untested. The first target investigated was the possible southern extension of the AGB zone. Geophysical surveys were also carried out further to the south, in the area of a previously defined airborne geophysical anomaly.

Also in the Toodoggone region, Stealth Minerals Ltd completed small diamond-drilling programs on its **Wrich Hill** and **Electrum/Beaver Dam** epithermal gold-silver vein prospects on its **Pine** property, approximately 15 kilometres north of Northgate's Kemess South mine. In addition, regional prospecting by the company led to the discovery of several new showings, including the Northwest Breccia zone and the **Sickle Creek** prospect, 40 kilometres north of the Kemess South mine. Prospecting along strike to the north of Sickle Creek has revealed a large gold-silver-bearing epithermal system in felsic volcanic flows and tuff. The system is over 5 kilometres long, and the company believes it to be part of a 16-kilometre alteration and structural zone that extends from the Northwest Breccia to the Kevin prospect. This trend comprises at least eight discrete mineralized systems. The southern part of the trend, between Nub Mountain and Sickle Creek, saw some preliminary work in 2003; the northern part remains virtually unexplored. Limited trenching on this new discovery outlined high-grade mineralization within a zone of lower grade material, 10 to 12 metres wide, (*e.g.* 3 m grading 9.5 g/t Au, 410 g/t Ag, 0.85% Pb and 0.32% Zn). A grab sample of vein material assayed 78.8 g/t Au, 2060 g/t Ag, 0.51% Cu, 11.4% Pb and 10.5% Zn. The alteration envelope, which is locally 100 metres wide, consists of quartz, carbonate, sericite and potash feldspar in a stockwork-vein system. Stealth utilized the PIMA infrared spectrometer instrument in the field to detect epithermal clay alteration minerals. The company, based on BC Geological Survey work, believes that the host andesitic to rhyolitic rocks may be older (Asitka Group?) than the previously mapped Hazelton Group (Toodoggone formation) subaerial volcanic rocks, along the eastern margin if the Toodoggone basin. The north-northwesterly trending Sickle Creek/Griz showings, contained within a zone approximately 3 kilometres long by 200 metres wide, are discontinuously capped by a hot spring and sinter sedimentary unit consisting of laminated, black muddy sediments and intercalated clay-rich sediments and opaline silica layers. Both the muddy sediments and the sinter contain gold and silver values. Gold and silver values also occur in quartz breccias, quartz carbonate veins, quartz stockworks and high-sulphide veins (together with base metals).

Sable Resources Ltd completed a small diamond-drilling program on the JM and Creek zones on its past-producing **Shasta** epithermal gold-silver mine. It also mined a small tonnage of ore from the existing open cut at Shasta and processed it at the company's **Baker** mill to the north.

In southeastern British Columbia, 40 kilometres southwest of Cranbrook, Klondike Gold Corp, under an option agreement with Sedex Mining Corp, trenched and drilled a north-trending, variably east-dipping silicified shear zone on its **Thea** 17 gold property. The zone cuts the Middle Proterozoic Aldridge Formation and a gabbroic Moyie sill. It has been traced by trenching and drilling over a strike length of approximately 600 metres. The zone is intensely silicified, variably limonitic, cut by numerous quartz veinlets and contains pyrite and visible gold. Its width varies between 2.5 and 11 metres. The zone is enveloped by fractured, variably argillic and limonite-altered siltstone that extends for several metres into the hangingwall and footwall. Trenching has returned assay intervals of up to 14.5 g/t Au over 4 metres. Drilling to date has tested the central part of the structure over a strike length of 200 metres with 13 short holes to a depth of 100 metres. Preliminary results indicate that the vein/shear dips at shallower angles in this area than previously interpreted and that the grade and thickness appear to increase to the south and at depth. The best results were from Hole 13 which assayed 3.7 g/t Au over 3.25 metres. Follow-up drilling is planned for 2004.

Thirty-five kilometres north of Kamloops, North American Gem Inc conducted an extensive trenching and diamond-drilling program on its **Bonaparte** mesothermal gold-silver vein, optioned from Clan Resources Ltd and Uganda Gold Mining Ltd. At least eight north to northeast-trending, steeply dipping veins have been exposed within quartz diorite. A new vein system (named the Eagle) was uncovered approximately 200 metres east of the Grey Jay/Crow vein system; vein width varies up to 3 metres. Follow-up drilling was conducted late in the year. Drilling also focused on the south end of the Grey Jay/Crow vein system to confirm and extend values obtained in a 1998 drilling program which returned 22 g/t Au over 2 metres. The Crow vein was trenched for over 70 metres in a southerly extension of the existing mining pit (3700 t grading 27.8 g/t Au shipped in 1994).

Lateegra Resources Corp, under an option agreement with Teuton Resources Corp, completed a 7-hole diamond-drilling program on its **Del Norte** mesothermal gold-silver vein/breccia property, located 30 kilometres east-northeast of Stewart. Mineralization includes pyrite, galena, sphalerite and tetrahedrite in quartz veins and quartz-cemented breccia in Salmon River Formation argillites. Drilling tested the steeply southwesterly dipping LG vein, traced for approximately 550 metres. Nearly 470 metres to the southeast and along strike from

the LG vein, the Kosciuszko zone has similar mineralogy and a similar strike. The best drill intersection (hole DN03-5) assayed 14.26 g/t Au and 2620 g/t Ag over 1.1 metres.

Northwest of Lillooet, J-Pacific Gold Inc discovered several quartz veins along four new roadcuts approximately 400 metres southwest of an area drilled in 2002 on its **Elizabeth** gold property. This new zone, the Southwest vein, contains quartz veins with coarse free gold over widths up to 2.75 metres. Trenching was also completed along the West vein, and prospecting and sampling were carried out on a potential new vein occurrence approximately 300 metres southwest of the No. 9 vein. The target at the No. 9 vein zone is the contact between listwanite and feldspar porphyry. The Elizabeth project is located 30 kilometres south-southwest of the permitted mill at the company's Blackdome mine, which is currently on standby but could be used for custom milling.

Skygold Ventures Ltd, under an option agreement with Wildrose Resources Ltd, completed geochemical and geophysical (induced polarization) surveys on the **Spanish Mountain** gold property, near Likely. A new zone of mineralization was discovered, approximately 1.3 kilometres south of Imperial Metal Corp's 2000 bulk sample pit (LE zone), where a 1900-tonne test mining sample averaged 3.0 g/t Au. This quartz vein, hosted by deformed, silicified Paleozoic sedimentary rocks, assayed 156.7 g/t Au over 0.3 metre. A chip sample of silicified wallrock, taken several metres away from the vein, assayed 3.1 g/t Au over the 2 metres sampled. The soil sampling program yielded some very high concentrations of gold. Elevated arsenic and distinctly anomalous molybdenum values accompany the higher gold values. The central gold anomaly, measuring 350 by 450 metres, returned an average gold content in the soils in excess of 1.5 g/t Au. The company identified a major northwest-trending anomaly that corresponds with the LE zone.

Lateegra Resources Corp, under an option agreement with Teuton Resources Corp and Minveta Enterprises Ltd, completed an eight-hole diamond-drilling program on the **Clone** gold property, 20 kilometres southeast of Stewart. The first two holes were designed to confirm historical results from two of the 140 holes drilled on the property during the period 1995 to 1997. Hole CL-03-02, sited close to the collar of DDH No. 11 (drilled in 1996) which returned 10 metres grading 43.9 g/t Au, assayed 80.8 g/t Au over 8.5 metres. The remaining six holes tested three separate targets in the Main zone. The company believes that results to date support the findings of a 1998 structural study completed by SRK Consulting Engineers, which suggests a gentle, northerly plunge to the gold-bearing shoots within the shears. Mineralization consists of specularite, chalcopyrite, magnetite and native gold in steeply dipping hematite+/-chlorite+/-silica+/-sericite-cemented zones. In addition, sulphide-dominated mineralization contains auriferous pyrite +/-arsenopyrite, and locally cobalt-bearing mineral(s). Hostrocks include a mega-breccia and andesitic pyroclastic rocks to the east and argillaceous sedimentary rocks to the west.

Northern Continental Resources Ltd, under an option agreement with Eagle Plains Resources Ltd, completed a four-hole diamond-drilling program on the **Abo (Harrison Lake Gold)** gold project, 100 kilometres east of Vancouver. Gold mineralization, identified in nine zones on the property, occurs within quartz veins, commonly associated with pyrrhotite, hosted by quartz dioritic stocks, and to a lesser extent metasedimentary rocks. Drilling further tested the margin of the Hill stock, together with a newly discovered North Hill stock zone. Mineralization associated with the Jenner and Portal stocks is reported to have a combined indicated resource of 1.8 million tonnes grading 2.8 g/t Au and an inferred resource of 614 000 tonnes grading 2.79 g/t Au.

Chapleau Resources Ltd, under an option agreement with Super Group Holdings Ltd, completed a two-phase diamond-drilling program on the **Bar (Lookout)** gold property, located 8 kilometres west of Cranbrook. The Bar prospect is one of ten significant gold prospects on Chapleau's large Cranbrook gold project. Auriferous sulphide mineralization is associated with a large structure, more that 50 metres wide and incorporating a number of shear zones filled by quartz breccias. The zone parallels and crosscuts a sediment/syenite contact, traced along strike on surface for over a kilometre. Follow-up drilling has confirmed a minimum strike length of 290 metres, and a minimum depth of 340 metres. On its **Zinger** gold property, also part of the large Cranbrook gold project, Chapleau carried out diamond-drilling in two areas: the Central and South Zinger zones, each measuring approximately 2 by 2 kilometres. Pyrite, galena, sphalerite, chalcopyrite, arsenopyrite, tetrahedrite and native gold occur in numerous quartz lenses and bedding-parallel stockworks composed of quartz, carbonate and sericite. The three mineralized zones (Central, North and South) are upslope from the well-known Perry Creek gold placer.

Jasper Mining Corp completed a major diamond-drilling program on its **Vowell Creek** polymetallic property, which includes the past-producing Ruth Vermont mine, 30 kilometres south of Golden. The property is approximately 19 kilometres long. Initial drilling tested for extension of the polymetallic ore mined at Ruth Vermont, associated with both vein and replacement- mineralization. Drilling confirmed high-grade silver-lead-zinc-arsenic +/-gold mineralization associated with relatively narrow, predominantly quartz or quartz and dolomite veins. On the south side of Vermont Creek, the Ruth vein system was intersected above the underground workings, but is much narrower than expected by the company. Drilling north of the creek was negative, suggesting the zone has either pinched out or been offset. The company has identified a second phase of gold-arsenopyrite mineralization within a grit unit immediately underlying the mine sequence.

Kodiak Exploration Ltd, under an option agreement with GCP Mining Corp and Lorne Warren, completed an induced polarization (IP) survey and a five-hole diamond-drilling program on the **Tommy Jack** gold-silver property, 120 kilometres north of Smithers. The program fo-

cused on the newly discovered East and West zones, outlined by the induced polarization survey. The high chargeability anomaly is over 1.2 kilometres long and between 150 and 300 metres wide. It coincides with a 600 metre by 1800-metre soil anomaly, the original discovery showing on Tommy Jack Creek and significant intersections of gold-silver mineralization intersected by historical, widely spaced, shallow drilling along the fringes of the IP anomaly. Drilling in 2003 also tested the Main (Camp) showing to depth and along strike. Several zones of low-to moderate grades of silver and/or gold were intersected in 0.5 to 1-metre thick, banded, quartz-arsenopyrite-tetrahedrite-galena-sphalerite veins. These occur within silicified and brecciated Bowser Group greywacke, cut by quartz-feldspar porphyry dikes, which appear to be the locus of iron carbonate/clay and silica alteration.

In the Tulsequah area of northwestern British Columbia, Canarc Resources Corp continued exploration and metallurgical testing at its past-producing **Polaris Taku (New Polaris)** mesothermal gold mine. A late-season, 3-hole, drilling program was completed. The high-grade underground mine produced almost 7775 kilograms (250 000 oz) of gold from 1938 to 1951. Metallurgical test work on a mini-bulk sample of high-grade material, collected in late 2002, significantly increased the gold recoveries from 90% up to 98.7%. A diagnostic leach test indicated that 9% of the gold is free milling, 69% is refractory, associated with arsenopyrite and pyrite, and the remaining 22% occurs with the quartz-carbonate matrix. Canarc is examining two alternatives for the gold recovery mill circuit at Polaris Taku. The first calls for production of a concentrate for treatment in a bio-leach plant to recover the gold from the concentrate and produce dore gold bars on site. The second entails the production of a concentrate for shipping to an autoclave treatment facility. Once initial bio-leach tests are complete, Canarc plans to repeat the scoping study to re-assess the project economics. Current geological resources are estimated by the company at 3 270 000 tonnes grading 13.7 g/t Au. If the nearby Tulsequah Chief property were to proceed to production, the infrastructure associated with it could significantly improve the economics of the Polaris Taku project.

In the southern Okanagan region near Okanagan Falls, Ecstall Mining Corp worked on its Dusty Mac and Vault low-sulphidation, epithermal gold-silver projects. At **Dusty Mac**, Eldorado Gold Corp, under an option agreement with Ecstall, completed a five-hole diamond-drilling program in the spring of 2003 and subsequently dropped the option. Later in the year, Ecstall completed geological mapping and sampling of the 400-metre- long Chalcedony zone, the Banded Vein zone and around the open pit. The Chalcedony zone is located 800 metres north of the previously mined open pit. At **Vault**, Ecstall completed a compilation of the previous Inco Ltd drill-log data, which included a field examination of twenty key intersections of Inco drill core (approximately 42 000 metres in 181 holes) stored on site. Gold mineralization in the Main 1 to 3 zones is hosted by Tertiary lahars and lesser amounts of felsite, while the North Vein is hosted by trachyte. These mineralized zones trend east-west. The Main 1 to 3 zones are capped by carbonaceous mudstones in a geological environment similar to the Republic gold camp, located to the southeast in northern Washington State.

Skarn/Manto Deposits

Cross Lake Minerals Ltd and Gold Giant Ventures Inc have signed a letter of intent to acquire a 100% interest in the past-producing **QR** auriferous skarn mine from Kinross Gold Corp. The fully equipped and permitted, 800-tonnes-per-day mill has been on care and maintenance since 1998. Proven and probable reserves estimated by Kinross, as of January 25, 1999, totaled 320 000 tonnes grading 5.1 g/t Au. Additional resources include 463 000 tonnes grading 5.0 g/t Au. Six zones of gold mineralization have been outlined, of which two (Main and West) were mined. A recently updated resource estimate of just over 900 000 tonnes grading 3.1 g/t Au was announced by the companies, most of which could be mined by open-pit methods. The companies' main exploration focus is to expand the known mineralization, especially the Northwest and North zones, which they believe to be the faulted extensions of the Mid-West and Main zones. Recent, 3D-inversion induced-polarization and soil geochemical surveys helped identify what is believed to be a new gold zone. It lies 400 metres east of the Main zone and is centred at a depth of 100 metres below surface, at the favourable contact of a basaltic unit and overlying siltstones.

Alpha Gold Corp completed a large, diamond-drilling program to test auriferous skarn/manto and vein targets in the large porphyry-related system on its **Lustdust** property, 150 kilometres northwest of Fort St. James. The 2003 drilling program tested high-grade gold mineralization in three areas: the No. 1, the No. 3 and the Canyon skarn zones. The No. 1 zone, the former Takla Silver mine, was drilled over a 750-metre strike length. Mineralization comprises stockwork veins and breccia zones in felsic intrusions, and limestone-hosted, sulphide-rich replacements and veins within a north-striking, subvertical structural zone. Hole DDH03-09 returned 13.27g/t Au over 5 metres. The No. 3 zone is an oxidized, gold-bearing carbonate-hosted manto. Gold-silver-zinc-lead mineralization was intersected in a north-northwest-plunging antiform structure to depths of greater than 100 metres. DDH03-30 returned 20.51g/t Au over 5.2 metres. Copper-gold mineralization in the Canyon skarn is the most proximal and highest-temperature mineralization encountered at Lustdust. Deeper drilling intersected 5.5% Cu and 3.63 g/t Au over 1.6 metres in DDH03-35, and 559 g/t Ag over 3.7 metres in DDH03-33. Alpha Gold also completed soil sampling and geological surveys in the Dream Creek area, north of the Canyon skarn, and across the main strands of the Pinchi fault near the former Bralorne-Takla mercury mine.

Six kilometres northeast of Hedley and 4 kilometres east of the past-producing Nickel Plate gold mine, Goldcliff Resources Corp completed a 1920-metre dia-

mond-drilling program on its **Panorama Ridge** auriferous skarn property. Trenching was also conducted on the Tower prospect, within the Castle gold zone. The Panorama Ridge property covers seven showings/anomalies within three large gold targets: Epic (400 by 500 m), Panorama (1000 by 500 m) and Castle (1000 by 1000 m). They cover an area 1.2 by 2.3 kilometres. Drilling tested parts of all three areas. Mineralization occurs in a similar geological setting to that at the adjacent Nickel Plate mine, which produced 74 600 kilograms (2.4 million oz) of gold between 1904 and 1996.

Magmatic Deposits

In May, 2003 Leader Mining International Corp released the results of a feasibility study from Hatch Associates Ltd on its **Cogburn** magmatic magnesium metal project, northeast of Harrison Hot Springs. The Cogburn deposit is estimated to have a preliminary measured resource of 25.5 million tonnes grading 24.5% Mg by weight in its proposed Emory zone quarry (300 by 300 m). The feasibility study indicated that the deposit has the potential to become a mine because of its large size, high magnesium grade, low impurity levels, favourable metallurgy and proximity to infrastructure. The capital cost of the project was estimated to be US$1.24 billion. Late in 2003, Leader Mining announced it had received an expression of interest from a major mining company.

On the eastern side of Harrison Lake, Stellar Pacific Ventures Ltd and International Millenium Mining Corp continued geological and geochemical surveys on several areas in the search for magmatic Ni+/-Cu+/-PGE deposits. A favourable north-northwesterly trending belt of sulphide-bearing ultramafic rocks, 2 to 10-kilometres wide (**'Pacific Nickel Complex'**) in contact with metasedimentary rocks, was the focus in 2003. This belt extends northwesterly for over 75 kilometres from the former Giant Mascot nickel producer. The companies completed an airborne geophysical survey over the southern portion of the belt. Also during 2003, International Peruminas Resources Ltd staked a large block of claims in the northern part of the favourable belt and optioned prospective ground from Murray McLaren and Paul Metcalfe. Follow-up prospecting and mapping resulted in the discovery of several new Ni+/-Cu+/-PGE showings, most notably those on the **Klatt** claim group. These have strong similarities to the mineralization at the Giant Mascot mine, 50 kilometres to the south.

On the **Turnagain** nickel prospect, 110 kilometres east of Dease Lake, Canadian Metals Exploration Ltd completed a twenty-three hole diamond-drilling program. It also conducted prospecting and mapping on the southeastern part of the property, on the Horsetrail, Silica and Northwest zones. Since 1996, the company has drilled 48 holes totaling 15 950 metres. Additional metallurgical test work will be carried out when all the assays are available from this year's program. Sulphide minerals consist mainly of pyrrhotite with lesser pentlandite and minor chalcopyrite; some bornite was also reported. Drillhole 03-18 averaged 1.0% Ni over 25 metres; including an 8 metre section grading 2.27% Ni and averaging 0.27% Cu.

Bright Star Ventures Ltd completed a 3D-inversion model of the airborne magnetic data over its recent platinum discovery on its **Tulameen** PGE project, 20 kilometres west of Princeton. High platinum values are associated with serpentinized chromitiferous dunite on Olivine Mountain. The 3-D modeling beneath the discovery area suggest deep-rooted structural controls. A detailed surface exploration program will follow-up on this target. Significant assays ranging from 0.54 g/t Pt to 24.9 g/t Pt were obtained 14 samples taken over an area measuring 300 by 450 metres.

Minterra Resources Corp, under an option agreement with Ursula Mowat, completed an induced polarization survey over the **Star** copper-platinum-palladium project, covering approximately 14 kilometres of the Polaris Ultramafic Complex, 13 kilometres northeast of Aitken Lake. Chalcopyrite and pyrrhotite (with platinum and palladium values) are disseminated throughout gently dipping olivine clinopyroxenite and pyroxenite layers.

Redbed Copper Deposits

In November, 2003, Doublestar Resources Ltd released results of a feasibility study by AMEC E&C Services on its **Sustut** redbed copper-silver deposit, approximately 65 kilometres south of the Kemess South mine in north-central British Columbia. The study was based on a concept of open-pit mining on top of the plateau that hosts the deposit, with the ore to be delivered to the valley floor, a vertical distance of 500 metres, through an ore pass located near to the open pit, and then by truck to the Kemess South mine for processing. A total of 4 676 000 tonnes of ore would be delivered over a 4.5-year mine life at an average grade of 2.02% Cu. The capital cost is estimated to be approximately $20 million. In mid-December, Doublestar announced it will review the feasibility study with the intent of eliminating tunnels and ore pass in favour of an aerial tramway system.

Kit Resources Ltd and Hathor Exploration Ltd completed a five-hole diamond-drilling program on their **Skutsil Knob (Copperline)** redbed copper-silver property, 120 km north-northeast of Smithers. Previous operators, including Cominco, Craigmont Mines and Inco, targeted a potential open-pitable resource in the Main zone, with 2% Cu, plus silver credits. The 2003 drilling program focused on confirming and expanding this resource and also testing an unexplored area of mineralization (the West zone), approximately 1.2 km southwest. The Copperline deposit is geologically similar to the Sustut property, 80 km northwest.

Placer Deposits

Placer gold exploration in British Columbia was concentrated in the Atlin (**Ruby** and **McKee** creeks), Dease Lake (Thibert Creek) and Manson Creek (**Manson** and **Slate** creeks) areas. Minor programs were completed in the Cariboo and Fort Steele areas.

COAL

A rationalization of western Canada's export coal industry took place in 2003, with the merger of the coking coal interests of Fording Coal Limited, Westshore Terminals Income Trust Fund, Luscar Energy Partnership and Teck Cominco Ltd to form the Fording Canadian Coal Trust. The Elk Valley Coal Partnership is initially owned 65% by the Fording Canadian Coal Trust and 35% by Teck Cominco Ltd. Teck Cominco can increase its ownership to 40% by achieving certain specified cost savings, which may be possible because of operational and marketing synergies. Teck Cominco also has a 9.1% interest in the Fording Canadian Coal Trust.

The five coal mines in southeast British Columbia are now operated by the Elk Valley Coal Corporation, which has a run-of-mine capacity of 27 million tonnes per year and a plant capacity of 30 million tonnes. A 5-year integrated operating plan has been developed to maximize cash flow over the longer term. In 2003, the five mines expect to export between 24 and 25 million tonnes of metallurgical coal. Elk Valley accounts for about $1.5 billion in export revenues, and employs more than 2500 highly skilled, full-time workers. There is potential to increase production by 2 million tonnes next year, depending on demand in China and the companies ability to compete with Australian producers.

Spot prices for hard coking coal ranged between US$48 and US$50 per tonne 2004. Prices for pulverized coal injection (PCI) coal, and semi-soft coking coal, were in the range of US$33 to US$36 per tonne. Most steel mills have installed PCI units and are now switching to low-volatile coals for injection as they give better replacement ratios. The PCI product usually has low ash contents of about 8% or lower. The small tonnage of thermal coal sold offshore usually commands a premium price because of long-term contracts (US$31 to US$38/t); however, world thermal coal prices for 2003 were in the range of US$26 to US$30 per tonne. The value of 2003 coal sales (at the mine mouth) is forecast to be in excess of CAD$ 1 billion, accounting for approximately 35% of the solid mineral production in the province.

British Columbia will export an estimated 24 million tonnes of coking coal and 1.3 million tonnes of thermal coal, for a total of 25.3 million tonnes, up from the 24.4 million tonnes in 2002. The **Roberts Bank** coal terminal, south of Vancouver, lost one loader during a wind storm, but it was back to its normal capacity of 26 million tonnes by the end of the year. The **Neptune** terminal, in North Vancouver, which has a capacity of 8 million tonnes per year, is expected to export between 4.5 and 4.7 million tonnes this calendar year. The **Ridley Island** terminal, at Prince Rupert, exported in excess of 500 000 tonnes of coking coal in 2003, but is now for sale. The last coal operation in the northeast, the **Bullmoose** mine, closed in April, 2003.

OPERATIONS

In the following section, tonnes reported are clean tonnes. The annual production at a mine may not match sales because of changes in inventories at mines and ports.

The **Fording River** mine expects to produce about 9 million tonnes this year and plans to increase production to 10 million tonnes in 2004. Most of the exploration this year was in-pit with 78 holes being drilled totaling 6100 metres. Exploration outside active pits comprised 1600 metres of drilling.

At the **Greenhills** mine, clean coal production this year should reach 4 million tonnes. A small in-pit exploration drilling program was completed.

At the **Line Creek** mine, manpower and production were both halved this year, to make the mine more competitive. Production in 2003 is forecast to be about 1.8 million tonnes, with some thermal coal included in this amount. In-pit exploration consisted of a 2400-metre drilling program on Horseshoe Ridge. Out-of-pit exploration involved the construction of a road north from the existing mine to access the **Burnt Ridge** area and a 2000-metre drilling campaign on this target.

Production at the **Elkview** mine in 2003 is planned to be 5.6 million tonnes. A 2500-metre, in-pit exploration drilling program was completed.

The **Coal Mountain** mine is forecast to produce 2.1 million tonnes, at a clean coal strip ratio of 5.7 to 1. The mine plans to increase production to 2.5 million tonnes in 2004, at an improved strip ratio of 4.9 to 1. In-pit exploration drilling totaled 4100 metres. A 5975-metre exploration drilling program was completed, in the Martin/Wheeler Ridge south of Parcel 73 in the Crowsnest Coalfield.

Hillsborough Resources Ltd continues to operate its **Quinsam** thermal coal mine at about 330 000 clean tonnes per year, with a work force of about 40 people. In 2003, the company planned a 900-metre exploration drilling program in the South 4 area, as well as some in-fill drilling for reserves. Quinsam is being considered as a supplier for a possible 60-megawatt power plant, which would use 0.5 to 1 million tonnes per year. A letter of intent was signed with Cinergy Corp of Cincinnati, Ohio to submit an independent power generation proposal to BC Hydro.

The **Willow Creek** (Pine Valley Mining Corp) mine, owned two-thirds by Globaltex Industries Inc and one-third by Matsui Matsushima Canada Ltd, has all permits in place to start mining. Currently, the company is awaiting a revised feasibility study from Norwest Corp that will include a reserve assessment, together with updated capital and operating cost estimates. Norwest has also been asked to review the regional exploration data in and around the project's Pine Pass area. Tender documentation for possible contract mining of the Willow Creek project is currently being prepared. If financing is secured,

the company plans to start production in 2004, reaching 900 000 tonnes per year as soon as possible, and eventually ramping up to 2 million tonnes per year. The coal is a mix of low to medium-volatile pulverized coal injection (PCI) and coking coal. Run-of-mine PCI product could be extracted and sold for at least the first year of operation.

At the **Basin (Tulameen)** coal project, in the Princeton area, Compliance Energy Corp and Nissho Iwai Coal Development (Canada) Ltd mined about 20 000 tonnes of thermal coal and transported it by truck to its wash plant at the Similco mine site, about 45 kilometres from the pit. The coal will be washed and sold to cement plants and greenhouses over the winter. The mine is closed for the winter but plans to re-start production in April and plans are to mine 75 000 tonnes in 2004. The companies are also conducting a pre-feasibility study for a 50-megawatt coal/wood waste generating plant, to be located near its new coal mine.

EXPLORATION PROJECTS

Exploration expenditures at coalmine sites, and elsewhere, have dropped significantly from $4.6 million in 2002 to $2.6 million in 2003. Much of the decrease was the result of the consolidation of the mines in southeastern British Columbia. Management was reorganized at a number of mines and this delayed exploration plans into 2004. This total includes coalbed methane (CBM) exploration or combined CBM and coal exploration that was permitted under the *Petroleum and Natural Gas Act*. An estimated $550 000 were spent on exploration on mine sites in active pits, and $2 million on out-of-pit, or grassroots exploration. Drilling on coal programs totaled approximately 32 000 metres, down approximately 27% from 2002. Exploration expenditures do not include the costs for bulk samples mined for test marketing.

Northeast British Columbia

Western Canadian Coal Corporation continues to explore its **Burnt River** and **Perry Creek (Wolverine)** coal deposits between the former Quintette and Bullmoose mines, about 20 kilometres west of Tumbler Ridge. The company submitted a revised project report description to the provincial Environmental Assessment Office that outlines a 1.6 million tonnes-per-year open-pit mining operation for the first 8 years at **Perry Creek**. The revised mine plan is based on mining 17 million run-of-mine tonnes. The proposed schedule provides for the mine start-up in 2005, at an initial capital cost of between $50 million and $116 million. At **Burnt River**, the company also completed a 1500-metre exploration drilling program in 2003. The company is assessing early development of this PCI coal property, for an additional production of 1.0 million tonnes per year.

Northern Energy and Mining Inc completed a trenching, drilling and sampling program to increase surface resources on its **Trend (Roman Mountain)** metallurgical coal property, south of the former Quintette mine. The property includes the Trend South, Extension, Hambler and Roman blocks; only the Trend South and Roman blocks have been explored. Currently defined inferred resources total 57 million tonnes. The Extension and Hambler blocks represent an 8-kilometre southwest extension of the same coal measures found in the South block. The company believes that the Extension block has the potential to more than double the resources found on Trend South. The 30 million tonne resource developed on the South block was calculated over a 3.5-kilometre length and to a depth of 350 metres.

The company is targeting development of 20 to 25 million run-of-mine tonnes of open-pit reserves in the South and Extension blocks, sufficient to support a 1.2 to 1.5 million-tonne-per-year operation with a 12 to 15-year mine life. The 27 million tonne Roman block and the Hambler block provide potential for expansion and a longer mine life.

Southeast British Columbia

In southeast British Columbia, all five coal mines have conducted in-pit drilling and some have continued exploration outside their active mine areas. The only grassroots exploration program was undertaken by Coal Mountain Collieries in the **Crowsnest Coalfield**.

In late 2003, Cline Mining Corp and its major shareholder, Mitsui Matsuishima Company Ltd of Japan, acquired the **Sage Creek** coal property, which was explored by Rio Algom in the 1970s. Previously reported open-pit mineable coal resources, contained in three seams with a cumulative thickness of 28 metres, totaled 149.9 million tonnes.

South-Central Coalfields

Petrobank Energy and Resources Inc conducted seismic surveys over the **Princeton Basin**, to assist in assessing its coalbed methane potential. There is renewed interest in the coalbed methane potential of the **Hat Creek Coalfield** where in excess of 5 billion tonnes of coal have previously been outlined.

Northwest British Columbia

Fortune Minerals Limited, which acquired the **Klappan** anthracite coal property in 2002, is now conducting various studies to outline a number of possible development scenarios. No additional exploration is planned.

Introduction and Investment Climate

Industrial minerals are an increasingly significant component of international trade and British Columbia is strategically located on the west coast of North America. It has well-developed transportation and industrial infrastructure in the southern, populated third of the province, a number of deep-water ports, and a well maintained, all-weather highway system that permits efficient long distance trucking. Rail lines link British Columbia's industrial centres to terminal points across Canada and the USA. The province has attractive energy costs and untapped mineral resources. BC's industrial mineral production for 2003 is an estimated $60 million, excluding sulphur estimated at over $43 million and structural materials that probably accounted for over $550 million.

Major Trends and Potential Opportunities

In recent years, the most significant industrial minerals trend in British Columbia has been an increasing export of crushed stone and natural aggregate to urban centres along the west coast of the United States and within BC's lower mainland. These markets are expanding as industry continuously identifies new development potential. A good example of this is the $100-million construction aggregate complex (with a ship-loading facility), which was granted an Environmental Assessment Certificate required to proceed with development near Port Alberni. This project, a joint venture between Eagle Rock Materials Ltd, the Hupacasath First Nation, the Ucluelet First Nation and Polaris Minerals Corporation, will have a capacity of 6 million tonnes per year. In 2001, a basalt quarry and related roofing-granule plant was developed at Ashcroft and in 2003 it produced about 250 000 t.

An increase in the use of natural pozzolans and lightweight aggregates in the cement industry is expected. The use of natural pozzolans and fly ash reduces energy consumption and greenhouse gas emissions. Most of the major cement-producing companies conduct research to investigate how highly reactive pozzolan may, in some cases, replace as much as 60% of portland cement while producing concrete with good set times and early strength. Pozzolan deposits located in southern and central British Columbia, near major population centres may benefit from increased interest from cement companies. Deposits of specialty, natural and lightweight aggregates, such as pumice, may be also benefit.

Niche markets, such as medical clay, jade, flagstone, tufa and other landscaping materials, have been expanding. They should continue to provide opportunities for smaller-scale operators.

It is expected that over the next few years, new opportunities will arise in the field of "green" minerals. Green minerals are those that can be used in environmental clean-up, agriculture, waste disposal and for other environmental uses. Agricultural markets for zeolites appear to be improving this year and these absorbent minerals may further benefit from the lifted moratorium on new salmon-farm developments in the province. British Columbia has number of well-documented bentonite deposits and at least a few of them are worth rigorous laboratory testing. Depending on test results, some of these deposits could supply material for linings and barriers in waste disposal applications, clay tile manufacture and potentially for drill-mud applications. For example, depending on design specifications, some of the British Columbia's bentonite could be used at the future Ashcroft Ranch Landfill solid waste project that is currently in the planning stage. This landfill will serve the Greater Vancouver Regional District.

Assuming that British Columbia offshore exploration drilling may become a reality, and that British Columbia bentonite meets specifications, this could develop into an important sector. In the longer term, there may be a new market for heavy aggregate along the coast, should an offshore oil and gas industry be developed. There could be new opportunities for drilling-related products.

Highly publicized announcements of emerald and blue gem-quality beryl discoveries in Yukon resulted in a Canada-wide coloured gemstone fever. Both Yukon and British Columbia have good exploration potential for beryl gemstones, and more specifically, for emerald and aquamarine deposits. Precious opal and gemstone exploration in British Columbia is benefiting from this increased interest.

Magnetite and olivine are commonly used as ballast materials on ocean drilling platforms. Over the long term, the magnetite market may also indirectly benefit from the Kyoto agreement; it is used in coal washing and is environmentally friendly and reusable. We expect that a future trend may develop where coal is processed near mine sites (ground, cleaned and slurried) and possibly piped to a power station where it could be de-watered and used. Increased processing of Canada's coal will ultimately result in making the process more efficient and reduce CO_2 emissions.

Activity Review

The most economically significant industrial minerals produced in British Columbia are: magnesite, white calcium carbonate, limestone, silica, dimension stone, gypsum, sulphur, construction aggregate and crushed rock. Commodities produced in lesser quantities include jade (nephrite), magnetite, dolomite, barite, volcanic cinder, pumice, flagstone, clay, tufa, fuller's earth and zeolites. There are more than 32 mines or quarries and at least 20 major sites where upgrading of industrial minerals into value-added products takes place, not counting the aggregate operations listed by the British Columbia Aggregate Producers Association. Most of these operations are concentrated close to existing infrastructure and markets (see Figure 7 for selected major operations).

Gypsum

Westroc Inc forecasts production of approximately 500 000 tonnes of gypsum from its **Elkhorn** quarries near Windermere. During the last several years, the company drilled 98 holes, which indicated a resource of 16.7 million tonnes of gypsum on its Koot property, northeast of Canal Flats. New reserves at Elkhorn West will postpone the need for development of the **Koot** deposit. Georgia Pacific Canada Inc will produce an estimated 175 000 tonnes gypsum from its **Four J** quarry near Canal Flats, about 100 000 tonnes will be shipped to its wallboard plant near Edmonton, Alberta. Both Westroc and Georgia Pacific operate wallboard plants in the Vancouver area. Lafarge Canada Inc mined a small quantity of gypsum from its **Falkland** pit (approx. 6000 t) for its Kamloops cement plant, supplemented by gypsum supplied by Westroc.

Magnesite

Baymag Mines Company Ltd produces magnesite at **Mount Brussilof** at a rate of about 200 000 tonnes annually. The company has two plants in Exshaw, Alberta. The first is a converted limekiln producing sintered magnesia; the second houses a 50 000-tonne capacity, multiple hearth furnace, a vertical-kiln dedicated to producing specialty calcined MgO and also an electrofusing installation. Calcined magnesia is the main product; however, a portion of production is further processed to high-quality fused magnesia for export. The company also sells crushed white magnesite for landscaping.

Silica

In 2003, the Dynatec Mineral Products Division (Mountain Minerals) of Dynatec Corporation extracted approximately 85 000 tonnes of silica from its **Moberly** mine, and shipped it mainly to Lavington , British Columbia. In the past, it also shipped lump silica to Springfield, Oregon, and other destinations; however, these shipments have stopped since the collapse of American silicon and ferrosilicon production.

During 2003, Lehigh Northwest Cement Limited (formerly Tilbury Cement Ltd) mined 49 000 tonnes of geyserite (silica material and minor clay) from its quarry at **Monteith Bay** on western Vancouver Island to supply its cement plant in Delta. Electra Gold Ltd and Homegold Resources Ltd mined 30 000 tonnes of geyserite from its **Apple Bay** deposit on Vancouver Island; this material will be tested at the Ash Grove Cement plant in Washington State.

Limestone

The largest limestone production centre in the province is **Texada Island**, where two quarries, **Gillies Bay** (Texada Quarrying Ltd) and **Blubber Bay** (Ashgrove Cement Corporation), traditionally ship 5 to 6 million tonnes annually. Their customers are in British Columbia, Washington, Oregon and California and they use the limestone for cement, chemical and more recently, agricultural use. In 2003, 3.25 million tonnes of limestone and 750 000 tonnes of aggregate are expected to be shipped from Gillies Bay where limestone production capacity is over 5 million tonnes and aggregate (crushed rock) capacity is approximately 1.5 million tonnes. Depending on customer demand, aggregate may be newly quarried granitic rock, stockpiled granite, limestone or a combination of these products.

Ash Grove upgraded its crushing plant in 2002. In 2003, 4 million tonnes of rock are expected to be mined and over 2 million tonnes of limestone shipped from Blubber Bay. Aggregate production was about 400 000 tonnes. Depending on its ability to win future contracts in California, the company is considering building a $10-million ship-loading facility on Texada Island. A joint venture of Lehigh Northwest Cement Limited and Chemical Lime Company of Canada Limited conducted exploration drilling and trenching on the **Lehigh Central Texada** project.

In addition to pulp mills, which normally produce lime internally, three cement plants and two lime plants in British Columbia process limestone. Graymont Western Canada Inc's **Pavilion Lake** limestone quarry and lime plant, near Cache Creek, has a production capacity of about 190 000 tonnes of lime annually. Lafarge Canada Inc announced a restructuring and downsizing of the **Kamloops** cement plant operations; the facility is expected to operate at less than 50% capacity in 2003. Lafarge's plant in Richmond, and Lehigh Northwest Cement Limited's plants in Delta, are state-of-the-art operations. The Richmond plant has the capacity to produce one million tonnes of cement annually. Pacific Lime Products Ltd at **Giscome**, near Prince George, sells small quantities of limestone to pulp mills in the region.

Northrock Industries Ltd provided a limited amount of limestone from its **Dahl Lake** quarry for riprap and landscaping. Graymont Western Canada Inc may submit its proposed 250 000-tonnes per year chemical limestone **Var** quarry, on Rupert Inlet near Port Hardy, to the Environmental Assessment Process.

White Calcium Carbonate

White, high-calcium carbonate is produced from deposits by Texada Quarrying Ltd from its **Gillies Bay** quarry on Texada Island, by IMASCO Minerals Ltd's **Benson Lake** quarry on Vancouver Island, and if needed, at its **Lost Creek** quarry near Salmo. It has a variety of uses including paper, paint and plastic filler.

Dolomite

Dolomite is quarried by IMASCO Minerals Ltd at its **Crawford Bay** mine on Kootenay Lake and by Mighty White Dolomite Ltd near **Rock Creek**. Dolomite is used for soil conditioning, white ornamental aggregate, stucco and roofing, fine aggregate and in synthetic marble products. A major exploration program is underway by Ash Grove Cement to delineate a dolomite deposit adjacent to

its limestone quarry on Texada Island. If needed, this deposit may be in production early next year.

Crushed Stone and Aggregate

Grassroots exploration for traditional construction materials continues to expand along the British Columbia coastline. Shipments of crushed stone from **Texada Island** and other coastal sources are making significant inroads into the Vancouver, Seattle, San Diego, San Francisco and Los Angeles markets. Texada Island limestone producers have already started to exploit this opportunity (see under limestone). Texada Island producers are well established, and crushed rock is the natural byproduct of their limestone operations. Natural aggregate is the focus of similar market demands. Lehigh Northwest Cement Limited shipped approximately 1 million tonnes of aggregate from its facility at **Sechelt** to the San Francisco Bay area in 2003. Polaris Minerals Corporation, in partnership with Eagle Rock Materials Ltd, is participating in the development of the **Eagle Rock** aggregate operation near Port Alberni. Qualark Resources Inc and the Yale First Nation have proposed a 12 million tonne-per-year aggregate operation, together with placer gold washing, at its **Hillsbar** quarry near Yale. Polaris Minerals Corp and the Kwakateil First Nation have a proposal for quarrying from its **Orca Sand and Gravel** operation near Port McNeil. Other companies propose similar ventures, including Southern Pacific Development Corp's project near Port Renfrew on southwestern Vancouver Island.

Approximately 210 000 tonnes of railroad ballast was produced in 2003 from British Columbia Railway's **Ahbau** basalt quarry, northeast of Quesnel. Canadian Pacific Railway's **Giscome** basalt quarry, northeast of Prince George, was inactive. The existing inventory of crushed ballast material at the site was sufficient to address the company's maintenance requirements in the region.

Canadian National Railways, however, also operated at least six other railroad ballast operations in British Columbia: **McAbee** (near Ashcroft), **Boulder** (near Clearwater), **Taverne** (near Tete-Jaune), **Pacific** (east of Terrace) and **Kwinitsa** (Mile 40 on the Skeena River). Canadian Pacific Railway mined, crushed and shipped railroad ballast at its **Swansea Ridge** gabbro quarry south of Cranbrook. No information is available about Canadian Pacific's **Walhachin** quarry.

The **Teko** pit, southwest of Taylor near Fort St. John, was a major aggregate-crushing operation in 2001 and reactivation is expected late this year. This pit mainly supplies material to the oil and gas sector in northeastern British Columbia (road metal, etc).

Roofing Granules

In October 2001, IG Machine and Fibers Ltd, a subsidiary of IKO Industries Ltd, opened its **Ashcroft** basalt quarry and roofing-granule plant. The plant produces 250 000 tonnes of granules per year, in six distinct colours. Basalt is quarried, crushed, sized and coloured on site, prior to shipping to IKO Industries shingle plants in Sumas, Washington, Calgary, Winnipeg and Chicago.

Industrial Clay and Shale/Sandstone

Clayburn Industries Ltd of Abbotsford processes fireclay from **Sumas Mountain** into a variety of refractory bricks and castable products, which are exported worldwide. Sumas Clay Products Ltd also produces small quantities of flueline pipe and ornamental and facing bricks near Abbotsford. Clayburn, Lafarge Canada Inc and Lehigh Northwest Cement Ltd can produce around 500 000 tonnes of shale and sandstone from their **Sumas** shale quarry. Clayburn is developing new light-weight aggregate with good insulation properties, based on this material. The difficulties that were encountered by the cement industry to access these resources in early 2003 resulted in a renewed exploration for alumina-rich materials. As a result the **Lang Bay** deposit, clinker from the **Hat Creek** area and a new occurrence discovered by Quinsam Coal are receiving attention. About 3000 tonnes of Hat Creek burnt shale were mined and shipped by Pacific Bentonite Ltd. Lafarge is testing the Hat Creek shale as a potential source of alumina for cement manufacturing.

Medical Clays

Ironwood Clay Company Inc is the largest producer of cosmetic/medical clay in British Columbia. It mines seasonally from the **De Cosmos Lagoon** on Hunter Island, west of Bella Coola.

Similar material from at least one other British Columbia locality, **Carrie Cove** in the Comox Valley, also reached market. It is currently sold by Carrie Cove Cosmetics for medicinal and cosmetic applications. It is also expected that Glacial Marine Clay Inc will be producing clay for specialized hydroponics applications. Mr. Robert Davie has an undeveloped clay deposit on **King Island**. The market for cosmetic/medical clay is limited; however, the processed product may retail for about $100/kilogram. The market for specialized hydroponics clays is larger and less stringent; however, the material still retails at prices around $20/kilogram.

Diatomite, Zeolite and Bentonite

Western Industrial Clay Products Ltd produces domestic and industrial absorbents, principally from its **Red Lake** fuller's earth deposit near Kamloops. In the Princeton area, the company also controls the **Bee** and **Brom** zeolite properties and is mining bentonite from the **Bud** property. The company secured a contract to sell humic acid (a leonardite derivative) to a major retail chain and experiments with the extraction of humic acid. The leonardite occurs between the diatomite horizons at Red Lake. There are number of known bentonite deposits in British Columbia.

Dynatec Corporation continues to report increasing annual sales of zeolite from the **Ranchlands Z-1** quarry near Cache Creek. It has drawn from existing stockpiles and there was very limited mining in 2003. Near Prince-

ton, progress was made to bring the **Zeo (Bromley Vale)** zeolite project into production. Zeo-Tech Enviro Corp planned test mining of 30 000 tonnes in late 2003 and formed a partnership, called United Zeolite Products Ltd, with C2C Zeolite Corp to build a processing plant. A 5-year supply agreement was signed with Haliburton Energy Services Inc to deliver specialty zeolite for use in a new light-weight oil and gas well cementing system. Construction of the new plant may begin as early as fall 2003.

Canmark International Resources Inc is attempting to develop a market in the Lower Mainland for zeolite from its **Sunday Creek** deposit near Princeton, but the mine remained inactive.

Dimension Stone

Westcoast Granite Manufacturing Inc in Delta, Margranite Industries in Surrey and Matrix Marble Corporation in Duncan operate stone-processing plants. Garibaldi Granite Group Inc in Squamish, declared bankruptcy. Margranite processes imported granite, and nine granite varieties, from at least three quarries in the **East Anderson River, Beaverdell** and **Skagit Valley** areas. Huckleberry Stone Supply Ltd of Burnaby and Mountain High Properties Ltd of Pemberton produced basalt from small quarries near **Whistler**. In 2003, Matrix Marble Ltd concentrated on processing imported and domestic materials at its plant near Duncan, but also extracted blue and white marble from its **Tahsis** quarry in Tlupana Bay.

Hardy Island Granite Quarries Ltd extracted about 3500 tonnes of stone this year and sold it through Bedrock Granite Sales in Coquitlam. In 2003, Quadra Stone Ltd produced a small tonnage of Cascade Coral blocks from its new **Fox Island** quarry. Near Kelowna, the Kettle Valley Stone Co produced flagstone, ashlar, thin veneer and landscape rock products from several quarries, the most popular being dacite ash (Mountain Ash) from its **Nipple Mountain** quarry. Kettle Valley purchased a new automated saw to help increase production.

Revelstoke Flagstone Quarries, Kootenay Stone Centre, and other small operators in the West Kootenays quarried flagstone. Small flagstone quarries were also opened in the North Thompson and Golden areas. Rocky Mountain Tufa produced around 2500 tonnes of tufa, mainly for landscaping applications.

Chrysotile

Cassiar Resources Inc (CRI) completed the sale of its mining property at Cassiar, BC, to Cassiar Jade Contracting Inc (CJC) of Watson Lake, Yukon. The assets transferred include all mining titles, the remaining infrastructure and chattels on the property, and an environmental reclamation bond posted with the regulators. CJC agreed to perform the remaining reclamation work and assumed all liabilities related to the property. CRI has an option to reacquire the Cassiar property if a major commercial opportunity should arise. CRI changed its name to Troutline Investments Inc.

Jade

Jade West Resources Ltd and its affiliated company, Polar Gemstones Ltd, are the main nephrite producers. In 2003, they produced about 200 tonnes of nephrite from the Kutcho Creek, Cassiar and Serpentine Lake areas in northwestern BC. Jade West also operates a jade processing facility in south Surrey. Jedway Enterprises Ltd extracted small quantities of nephrite from its Kutcho Creek and Polar sites. Cassiar Mountain Jade, with outlets in Jade City and Quesnel, produced approximately 20 tonnes of raw material from its Princess property. Cassiar Jade Contracting Inc, who bought chrysotile-related assets from Cassiar Resources Inc, continues to recover nephrite from mine dumps near Cassiar.

Pumice, Tephra and Lava Rock

Canada Pumice Corp produced about 20 000 m^3 of tephra from its **Nazko** quarry, west of Quesnel. The material is used for landscaping, sporting facilities, growing and filtration media, and as lightweight aggregate. Great Pacific Pumice Ltd ships a variety of pumice-based products from its **Pum** property on Mt Meager, north of Pemberton. Production in 2003 was estimated at 7000 m^3 and the material from this deposit was successfully tested by two major cement-producing companies as a pozzolanic additive. Garibaldi Aggregates Ltd also started to produce pumice from the Mount Meager area.

Mineral Wool

Roxul (West) International Inc invested in new plant improvements at an insulation/mineral wool manufacturing plant in Grand Forks. Since 1999, it invested $25 million in the project, while in 2002 it spent about $4 million to improve its competitiveness and on environmental initiatives. The plant's main source of raw material was the **Winner** diorite quarry at Greenwood, 4 km south of the former Phoenix mine. In 2003, about 50 000 t of diorite were mined and crushed. The material from Winner quarry is supplemented by talus material from **Cannon Creek**. During the last few years, slag was recovered from Roxul's operation in Greenwood, however, in 2003 the company reverted to Pacific Abrasives & Supply Inc, its original supplier in Grand Forks.

Slag

Pacific Abrasives & Supply Inc is producing and processing slag from **Grand Forks** dumps, mainly for sandblasting at major shipyards and for roofing granules. Slag was also shipped from **Anyox** by Tru-Grit as abrasive for cement industry applications, mainly in the Vancouver area, and for roofing granules and other abrasive applications. Teck Cominco Ltd is also a major slag producer at its **Trail** smelter. It markets these products mainly for cement production and abrasive applications. For the last few years, slag was recovered in the **Greenwood** area, mainly as raw material for producing mineral wool by Roxul (West) International Inc in Grand Forks. However, in 2003 MRI Americas purchased slag from Greenwood

and trucked it to Mission, shipped it on barges to Texada Island and on to Poland, for use in producing lead crystal. An initial 25 000 tonnes was extracted in October, 2003; further shipments are anticipated.

Magnetite

M-Seven Industries Inc produces between 60 000 and 70 000 tonnes of magnetite annually by processing the **Craigmont** tailings. The company is supplying most coal mines in western Canada with heavy media material for wash plants. Quinsam Coal optioned the **Iron Mike** and **Iron Ross** magnetite occurrences, approximately 6 km south of Sayward, and adjacent magnetite deposits. Benson Magnetics Ltd continues to investigate the feasibility of installing a 25 000 tonne-per-year plant near Benson Lake, on Northern Vancouver Island. Trends in clean coal processing may lead to the development of additional magnetite resources in British Columbia.

Graphite

In 2002, Crystal Graphite Corp released new resource calculations for its Black Crystal graphite deposit in the **Slocan Valley**. The weathered zone has 648 000 t containing 1.82% fixed carbon, in measured and indicated resources, and 516 000 t of inferred resources containing 1.69% fixed carbon. The underlying unweathered zone has indicated resources of 4.8 Mt containing 1.21% fixed carbon, and 4.6 Mt of inferred resources containing 1.24% fixed carbon. In 2002, they received a permit to process flake graphite to a maximum feed rate of 250 000 tonnes a year. In February 2003, the company announced that its processing plant was ready for continuous operation and it is planning upgrades to enhance productivity. The company planned to mine an additional 2500 t of graphitic plant feed in October 2003.

Sulphur

Duke Energy Corp, Petro-Canada Inc, TransCanada Midstream and Amoco Canada Petroleum Co Ltd produce sulphur, a byproduct of natural gas, at processing plants in northeast BC. Liquefied SO_2 and sulphuric acid are also produced at Cominco's smelter in Trail. A rough estimate for BC's sulphur production for 2002 was 865 000 tonnes. Production in 2003 is expected to be substantially better, due to increased Chinese demand resulting in shortages and substantial price increases. BC's 2003 sulphur production is sold on contracts, and there is none left for spot market sales.

High Tech Minerals

Commerce Resources Corporation continued to explore its **Fir** carbonatite deposit near Blue River. Newly released resource estimates for the Fir are 5.6 Mt of indicated and 6.7 Mt of inferred resources, both grading 203.1 g/t of tantalum pentoxide and 1047 g/t of niobium pentoxide. The Fir ferrocolumbite and pyrochlore-bearing carbonatite appears flat-lying, and is outlined over an area of 425 by 325 metres. The company also announced two preliminary cost assessments on processing and beneficiation of tantalum and niobium-enriched carbonatites. A bulk sample of approximately 800 kg, comprising core from a number of diamond-drill intercepts, was used in a small-scale metal recovery test. It indicated recoveries for tantalum and niobium in the range of 83 to 91%. Gravity testwork was also done. Other metallurgical testing is ongoing. The 2003 exploration program was to define the extent of mineralization previously identified as the Upper Fir carbonatite, which may be an offset of the Fir deposit. According to the company, average concentrations for all the 2003 samples from the Upper Fir carbonatite are 267 g/t Ta_2O_5 and 3746 g/t Nb_2O_5.

Gemstones

Okanagan Opal Inc continues to cut, test and market precious opal from the **Klinker** locality near Vernon. Follow-up prospecting and excavating were conducted on the **Northern Lights** precious opal occurrence in the Whitesail Range, south of Houston. During 2003, the Schaefer family continued to extract precious opal by hand from its **Firestorm** property, west of Burns Lake. Cream Minerals Ltd discovered ice-blue to deep greenish blue beryl crystals (aquamarine) on its **Kootenay Gemstone** property (formerly Bayonne Aquamarine), near Salmo. The beryl and gemstones in pegmatites and quartz veins occur over 23 km, along a favourable contact between pegmatitic dikes and sedimentary rocks. Mapping, rock and soil sampling identified several prospective zones prospective for emerald. Eagle Plains Resources Ltd reported gem-quality aquamarine, associated with pegmatites, on its **Blue Hammer** property in the Doctor Creek area, 45 km northwest of Cranbrook.

Barite

Tiger Ridge Resources Ltd continued underground development and bulk sampling of two adits on its barite project at **Jubilee Mountain**, west of Spillimacheen.

In 2003, Fireside Minerals Ltd produced 10 000 tonnes barite from its **Fireside** quarry east of Watson Lake. About 12 000 to 15 000 tonnes was mined from the Bear Pit. In northern BC, the high-grade **Nonda** and lower grade **BV** barite deposits are being investigated by Mr. Horst Klassen.

Wollastonite/Garnet

In 2003, RossWoll Industries Inc, a private company formed by Grid Capital Corp, purchased a wollastonite deposit near Rossland from Mr. Klassen.

Perlite

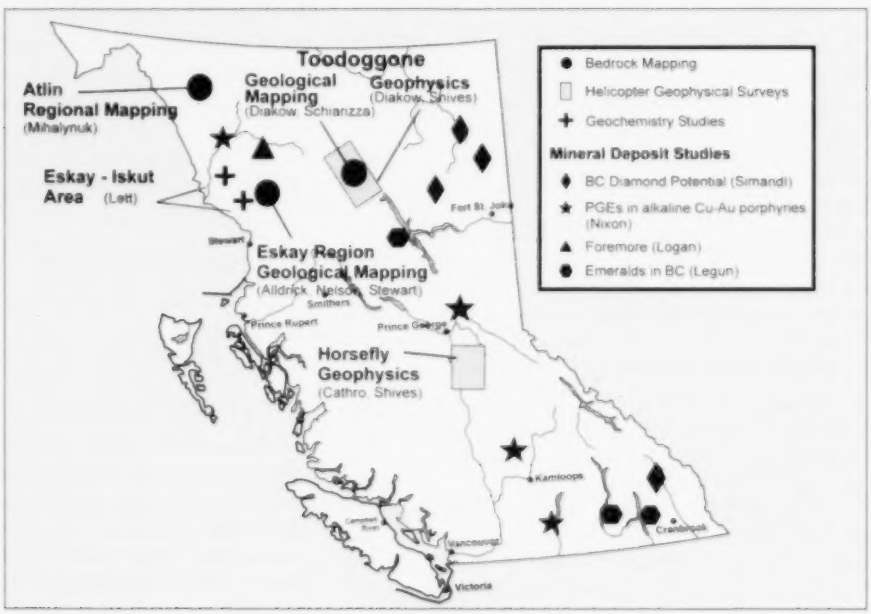
In September 2003, BBF Resources Inc extracted an 180-tonne bulk sample of perlite from the **Frenier** deposit, west of Clinton. The material was trucked to Abbotsford for processing and test marketing for horticultural use. Prospectors are also exploring for perlite deposits closer to Vancouver, where there is good potential for a perlite expander installation.

GOVERNMENT EXPLORATION AND MINING INITIATIVES

During 2003, the Government of British Columbia continued a number of measures to assist mineral resource planning, exploration and development, including:

- The *British Columbia Mining Exploration Tax Credit Program* continued in its fifth year. It provides for a 20% refund credit of qualified expenses not funded by flow-through shares. This is in addition to the 15% federal tax credit and the existing 100% Canadian Exploration Expense deduction, equivalent to a 139% tax deduction. In 2003, BC had the second most attractive mineral tax incentive program in Canada.
- The federal government's flow-through shares incentive program continues to be strongly supported by the provincial government to promote exploration and development of the province's mineral resources.
- The Ministry of Energy and Mines completed a number of geoscience programs (Figure 11). An airborne geophysical survey was completed in the Toodoggone area. The Ministry also participated in a limited number of private-public partnership programs, generally for short time periods. As part of the *Rocks to Riches Program*, an airborne geophysical survey was completed in the Horsefly area, including a very prospective tract of land south of the Mount Polley mine. Results of these two surveys are expected to be released in late March, 2004.
- The province continued to examine the economic and social viability of a road link between the mineral-rich Toodoggone area, including the Kemess South mine, and the deep-water port at Stewart.
- Over the past year, the Ministry of Energy and Mines published 7 Open Files, 3 Geoscience Maps, 23 GeoFiles, 2 Papers, 6 Information Circulars together with *Geological Fieldwork 2002* (20 manuscripts) and *Exploration and Mining in British Columbia-2002*.
- MapPlace, **MINFILE, CoalFile** and **ARIS (Assessment Report)** databases continue to be upgraded and made more easily accessible to clients on the Ministry website: **www.em.gov.bc.ca/geology**
- In 2003 the Ministry participated in a very successful 5-day Mining Investment Mission to London, England, along with representatives from the British Columbia and Yukon Chamber of Mines, the Tahltan First Nation and the mining sector of the Toronto Stock Exchange. The purpose of the trip was to improve investor perceptions regarding mining and exploration in British Columbia.
- Ministry staff played key roles in organizing and speaking at mineral industry conferences and fieldtrips, as well as participating in company meetings to help promote new exploration opportunities.
- The Ministry provided support for the well-known prospector field school, a joint venture between the British Columbia Institute of Technology and the British Columbia and Yukon Chamber of Mines.

Figure 11. Field programs carried out by the British Columbia, Geological Survey and Development Branch, Ministry of Energy and Mines



Exploration Outlook for 2004

The harmonized *Exploration Investment Tax Credit* for flow-through share investors in new British Columbia projects, coupled with the *British Columbia Mining Exploration Tax Credit*, are key elements to significantly increase mineral exploration financing in 2004.

Positive trends in exploration expenditures, successes at several advanced exploration projects, the increased number of new discoveries recorded in 2003, and the number of significant property acquisitions, all bode well for a vibrant 2004 exploration season. In the final months of 2003, companies completed many financial transactions targeting British Columbian projects. Depending on individual circumstances, these companies either started their exploration programs knowing that most of the work would carry over into 2004, or they simply decided to defer work until 2004. Many advanced exploration projects have recently commissioned feasibility studies and these should provide the opportunity for some to proceed to production in the near term. At least three mines, currently on standby (**Gibraltar, Mount Polley** and **QR**), may begin the process to re-open their operations in 2004. Run-of-river hydro project proposals throughout the province may provide the additional infrastructure necessary to enable mine development in remote areas (*e.g.*, the **Forrest Kerr** hydroelectric project in the northwest, scheduled for completion in 2006).

Gold is again expected to be the main exploration target, followed by copper. In addition, significant increases in nearly all other commodity prices, particularly molybdenum, zinc and platinum group elements, will help lead to a new boom in mineral exploration.

The gold±copper±molybdenum porphyry and intrusion-related targets will continue to be a focus of exploration throughout the province; particularly the alkaline porphyries within the Quesnel Trough.

The **Eskay Creek** mine with its total resources in excess of 1.43 million ounces of gold and 64.4 million ounces of silver (Dec 31, 2002), continues to attract attention, particularly in the northwest, where there is good potential for similar stratabound, precious metal-enriched, subaqueous hot-spring deposits. Several grassroots exploration programs and claim acquisitions, which were completed in the area between Kitsault and Dease Lake during 2003, are expected to receive funding and lead to new exploration efforts in 2004.

Property consolidations in many of British Columbia's past-producing gold camps (*e.g.* **Bralorne, Greenwood** and **Wells-Barkerville**) should lead to advanced work programs, including bulk sampling, in 2004.

Exploration for both bonanza and bulk-mineable, epithermal deposits will intensify. High-sulphidation targets and the transition zone between true epithermal and porphyry environments are favourable targets for the discovery of precious metals. In addition, the recent discoveries of bonanza, epithermal gold mineralization by Kinross Gold Corp at **Emanuel Creek (Kettle River mine)**, in the Republic camp of northern Washington State, should lead to increased exploration for similar mineralization within the southern Okanagan region.

Government Initiatives

- **Mining Task Force to help plan industry revitalization**
- **Exploration Investment Tax Credit**
- **Mining Investment Mission to London**
- **Flow-Through Shares**
- **Major geoscience database additions and revisions**

Exploration for nickel±copper±platinum group elements will increase in the 'Pacific Nickel Complex', within Wrangell Terrane on Vancouver Island and other areas of BC where there are prospective ultramafic intrusions.

The **Wolverine (Perry Creek), Willow Creek, Burnt River, Trend** and **Sage Creek** coal projects are advancing towards production, some perhaps as early as 2005. There is a strengthening of the international coal markets and interest in coalbed methane exploration and development is expected to continue.

Industial minearls production continues to grow steadily through developing additional markets and mining more commodities. In 2004, it is anticipated that there will be more developments, particularly with respect of offshore aggregate sales, industrial clays, limestone and possibly gemstones and perlite. Sulphur sales are expected to be particularly strong again next year.

For additional information, contact:

Vancouver MDO: Senior Regional Geologist
Tom Schroeter,
Geological Survey and Development Branch, Vancouver
tel 604-660-2812; fax 604-775-0313
E-mail Tom.Schroeter@gems6.gov.bc.ca

Northwest: Regional Geologist
Paul Wojdak,
Mining Operations Branch, Smithers
tel 250-847-7391; fax 250-847-7603
E-mail: Paul.Wojdak@gems5.gov.bc.ca

Northeast &North-Central: Regional Geologist
Bob Lane,
Mining Operations Branch, Prince George
tel 250-561-5606; fax 250-561-5622
E-mail: Bob.Lane@gems4.gov.bc.ca

South-Central: Regional Geologist
Mike Cathro,
Mining Operations Branch, Kamloops
tel 250-371-6069; fax 250-371-6070
E-mail: Mike.Cathro@gems2.gov.bc.ca

Southeast: Regional Geologist
David Terry,
Mining Operations Branch, Cranbrook
tel 250-426-1658; fax 250-426-1652
E-mail: David.Terry@gems2.gov.bc.ca

Coal Geologist
Barry Ryan,
O&G Emerging Opportunities and Geosciences Branch, Victoria
tel 250-952-0418; fax 250-952-0922
E-mail: Barry.Ryan@gems4.gov.bc.ca

Industrial Minerals Geologist
George Simandl,
Geological Survey and Development Branch, Victoria
tel 250-952-0413; fax 250-952-0381
E-mail: George.Simandl@gems2.gov.bc.ca

Internet access to British Columbia, Ministry of Energy and Mines information

Mining and Minerals Division
www.em.gov.bc.ca/Mining/

Geological Survey and Development Branch
www.em.gov.bc.ca/Mining/Geolsurv/

BC Mineral Titles
www.em.gov.bc.ca/Mining/Titles/

MapPlace
www.mapplace.ca OR www.em.gov.bc.ca/MapPlace/

Geoscience Publications Catalog
www.em.gov.bc.ca/Mining/Geolsurv/Publications/

GeoFiles - digital geoscience maps and reports
www.em.gov.bc.ca/Mining/Geolsurv/Publications/catalog/cat_geof.htm

BC Minerals Industry Information Directory
www.em.gov.bc.ca/dl/GSBPubs/GeoFile/GF2003-23/GF2003-23InfoSources.pdf